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# **Journal of Current Development in Artificial Intelligence**

## **Aims and Scope**

Journal of Current Development in Artificial Intelligence is a Journal addresses concerns in applied research and applications of artificial intelligence (AI). the journal also acts as a medium for exchanging ideas and thoughts about impacts of AI research. Articles highlight advances in uses of AI systems for solving tasks in management, industry, engineering, administration, and education evaluations of existing AI systems and tools, emphasizing comparative studies and user experiences and the economic, social, and cultural impacts of AI. Papers on key applications, highlighting methods, time schedules, person months needed, and other relevant material are welcome.

# Journal of Current Development in Artificial Intelligence

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# RESEARCH ON ENERGY AND RESOURCE-SAVING TECHNOLOGIES FOR THE PURIFICATION OF PLANT RAW MATERIALS

**Barakaev N.R., Kuzibekov S.K**

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## I. INTRODUCTION

IN the world, research is being conducted on the preparation of crop seeds for processing, improvement of existing equipment that meets modern requirements, creation of processes and installations for aspiration and separation of seeds by their size and weight. In the production of high-quality oil necessary for the food industry, special attention is paid to the improvement of soybean seed separation plants, purified from various impurities, with increased oil content and intact shell.

**The relevance of the work.** Today, around the world, special attention is paid to the processing of agricultural raw materials, the development of food production and ensuring their safety. In this regard, the creation of energy- and resource-saving techniques and technologies of processes and equipment for the purification and separation of plant raw materials, in particular soybean seeds, from various impurities is of particular importance. A number of research works were carried out to improve the technology of primary processing of soybean seeds, purification and fractionation of soybean seeds with high technological indicators. However, the conducted studies have not fully studied the system of aspiration of plant seeds, including soybean seeds, depending on their geometric dimensions and weight.

Based on these tasks, in particular, the study of the physical and mechanical properties of soybean seeds grown in local conditions, the development of effective methods of aspiration system by weight and geometric dimensions of seeds, as well as the development of energy-saving designs of separation devices is of great scientific and practical importance.

**The purpose of the work.** Based on this, we have analyzed the efficiency of the functioning of modern devices designed for fractionation and separation of seeds (grains) of legumes and cereals; the main factors affecting the technological performance of this equipment have been identified. The analysis of the degree of purification of soybean seeds from impurities by the aspiration method was carried out, elements of the aspiration theory were described, and appropriate conclusions were drawn.

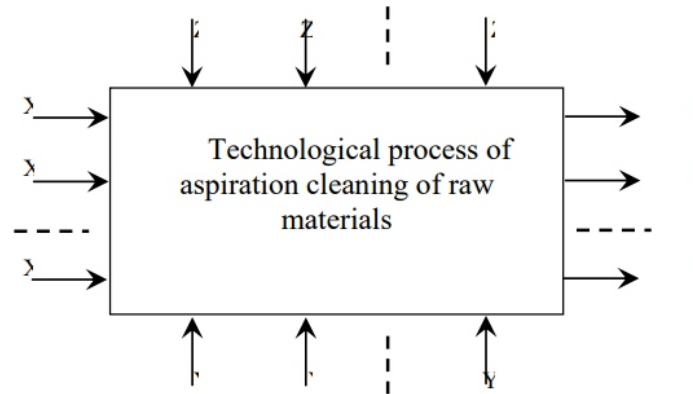
In the variety testing, the physical characteristics of soybean varieties and their seed properties were studied. The results of the study are shown in Table 1.

**Table 1**  
**Physico - chemical quality indicators of domestic soybean varieties**

Seed quality indicators (grain)	Soyvariety			
	Nenas	Tumaris	Ustoz	Baraka
Seed sizes, mm:	6,79±0,0	7,10±0,0	6,79±0,0	7,60±0,0
- length	9,483±0,0	9,065,91±0,0	9,094,83±0,0	9,096,36±0,0
- width	5,456±0,0	5,054,77±0,0	5,054,22±0,0	5,074,85±0,0
- thickness	9,456±0,0	9,064,77±0,0	9,094,22±0,0	9,064,85±0,0
Humidity, %	8,0	9,2	9,6	9,6
Soreness, %	5,3	3,2	7,3	4,2
Mass fraction of fat, %	23,50	23,50	22,71	14,85
Mass fraction of protein, %	42,52	42,48	39,86	36,90

A computer model describing the laws of the air flow and movement of soybean seeds in the plant has been developed. A method for calculating the concentration of dispersed particles in the air flow system of the aspiration system is presented.

The factors influencing the fractionation of soybean seeds and the seeds of various plants contained in them were determined by taking Y, Z as input parameters and X, U as output parameters (Fig. 1).



**Figure 1 - Block diagram of the aspiration process**

The group of parameters Y characterizes the design parameters of the aspiration part of the separator, Z - the properties of the soy mixture and the feed rate, X, U - mass, soreness, fan suction rate.

The objective of the study is to identify patterns of communication between the input and output parameters of the object. The aerodynamic parameters of the functioning of the diametral fan were investigated with the following parameters: the width of the impeller  $B=0.1$  m; the rotation speed  $p=1000$  vol/min; the performance  $Q_v=0.3$  m<sup>3</sup>/s.

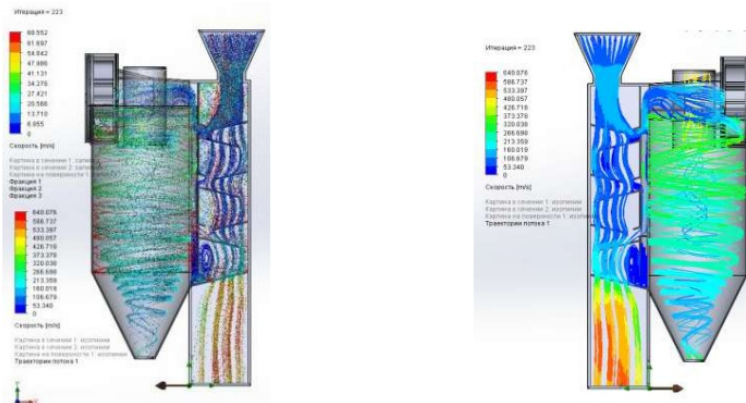
At the same time, the outlet pipeline of the purified raw materials was installed taking into account the absolute absorption to remove impurities. The rate of entry of products into the pneumatic separation channel was  $V_p=0.5$  m/s. The parameters of the simulated particles are given in Table 2.

**Table 2  
Parameters of the simulated product**

Product	$\rho_p, \text{ kg/m}^3$	$\bar{V}_{vit}, \text{ m/s}$	$d_e, \text{ m}$
Soy	720	30,6	0,0070
Averagenaturalratios	520	4,4	0,0009
The relations are easily natural	260	2,3	0,0005

At the same time, the mass fraction of light and average natural ratios did not exceed 1.0%, respectively.

Figure 2 shows the trajectories of model particles inside a closed air system.



**Figure 2 - Trajectories of model particles in the air flow velocity field**

With the help of computer modeling, the values of the basic physical parameters for the aerodynamic scheme of the combined separator plant were obtained, and the design and quality of the aspiration process improved by the combined separator plant were analyzed.

And so, we have developed a method for calculating the movement of the air flow during the movement of plant seeds on the surface of the racks of the aspiration unit; the critical air velocity, product consumption, and the angle of inclination of the perforated walls have been determined and scientifically substantiated; the rational regime of the process of fractional separation of seeds is determined and justified the device of the combined aspiration separator, which implements rational modes of the process of fractional separation of seeds, has been upgraded.

At the same time, the practical significance of the research can be explained by the fact that the new combined separator for cleaning and fractionation of seeds by weight is energy-saving and has high technical indicators.

**CONCLUSIONS.** Based on the results of computer modeling and analysis, optimal modes of seed (grain) fractionation have been determined soybeans in a combined separator unit: air intake speed 4.5 m/s, angle of inclination of perforated shelves  $14^\circ$ , volume flow rate 0.006 m<sup>3</sup>/s, the rotation speed of the feed shaft is 420 vol/min, the angle of inclination of the guide  $\alpha=45^\circ$ .

In the proposed method, the degree of purification of raw materials has been increased to 98.3% and energy consumption has been reduced by 2 times; extraction has increased by 3.0-3.5% the ability of soybean grains sorted into seeds;

During the research, the oil content in sorted soybean seeds (grains) averaged 16.2%, and according to the current comparative method - 14.5 %;

According to the results of the research, a combined separator unit equipped with an aspiration system designed for cleaning soybean seeds (grains) has been developed and put into production.

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# IMPROVEMENT OF TECHNOLOGY OF GYPSUM PRODUCTION RAW MATERIALS AND PRODUCTS IN PRODUCTION

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## ABSTRACT

*Gypsum materials are one of the most effective and promising types of building materials, the production of which currently requires expansion and modernization, taking into account the latest achievements of science. This article focuses on the production of gypsum products and the improvement of production technology.*

**Keywords:** *binders, technical properties, gypsum products, phosphogypsum, borogips, sulfur, rocks.*

## I. INTRODUCTION

In construction, mineral binders are called powder materials. Once they are mixed with water, they gradually harden and turn into a stone-like state. Building materials are divided into two groups: inorganic (mineral) and organic. The most important of the mineral materials are cement, cement grades, lime, gypsum, etc. [2]

Gypsum materials are one of the most effective and promising types of building materials, and their production now requires expansion and modernization, taking into account the latest advances in science. By expanding the use of gypsum building materials and products based on them, their performance properties can be improved. One way to improve the technical properties of gypsum materials and products is to use plasticizing additives that allow them to change their various properties. The properties of gypsum materials are determined by their structure, so the study of the effect of plasticizing additives on the hardening and performance properties of gypsum is currently an urgent task of the construction industry. [3]

## ERATURE ANALYSIS AND METHODOLOGY

Gypsum- mineral, alkali calcium sulfate. It occurs in cases such as gypsum stone, mirror stone, monmarite, sand rose, desert rose, gypsum feldspar. Gypsum is one of the oldest mineral binders. In Asia Minor, gypsum was used for decorative purposes for 9,000 years BC. During archeological excavations in Israel, gypsum-covered floors were found in the 16th millennium BC. Gypsum was also known in ancient Egypt, it was used in the construction of pyramids. The knowledge of the production of Paris gypsum from Egypt spread to the island of Crete, where many of the outer walls of the palace of King Knossos were built of gypsum. The joints in the wall are filled with gypsum solution. More information about gypsum came to Rome through Greece. Information about gypsum from Rome spread to central and northern parts of Europe. Gypsum has been skillfully used, especially in France. After the Romans migrated from Central Europe, knowledge of the production and use of gypsum in all areas north of the Alps was lost, and it was only from the 11th century that the use of gypsum began to increase again. Under the influence of the monasteries, technology spread, according to which the cavities inside the

half-timbered buildings were filled with a mixture of gypsum, hay, or horsehair. In early medieval Germany, especially in Thuringia, the use of gypsum was known for flooring stones, bricks, ornaments, and monuments. Saxe-Anhalt has 11th-century remains of gypsum flooring. The walls and stones built in those ancient times are distinguished by their extraordinary durability. Their strength can be compared to ordinary concrete. A distinctive feature of these medieval gypsum solutions was that the binders and fillers were of the same material. Gypsum stone was used as filler, crushed to round grains, without tip and without layer. Once the solution has solidified, a bonded structure consisting only of calcium sulfate dihydrate is formed. Another feature of medieval lime is the high fineness of gypsum grinding and very low demand for water. Calcium oxide (CaO) 32.6%, sulfur trioxide (SO<sub>3</sub>) 46.5%, water (H<sub>2</sub>O) 20.9%. Thin crystals and décolleté plates are flexible. [1]

The crystal structure is layered — two sheets of 2 anionic groups closely related to Ca<sup>2+</sup> ions form bilayer layers oriented along the plane (010). The gaps between these two layers are occupied by H<sub>2</sub>O molecules. This easily explains the very perfect detachment typical of gypsum. Each calcium ion is surrounded by six oxygen ions and two water molecules belonging to the SO<sub>4</sub> group. Each water molecule binds the Ca ion to one oxygen ion in the same two-layer layer and to another oxygen ion in the adjacent layer.

## RESULTS

At present, many different methods have been proposed to increase the water resistance of gypsum products. They are based on reducing the solubility of gypsum, compressing the gypsum mass, absorbing it with substances that prevent moisture from entering the product. [5] One of the most effective and economical ways to increase the water resistance of gypsum binder products is to introduce Portland cement with active hydraulic additives. This compound binder is called gypsum-cement-pozzolanic (GCPV). Samples were prepared from the following materials: gypsum (G-5), PC (M400), additives (crushed expanded perlite (I), powder obtained by grinding an expanded liquid bottle at a temperature of 250-300 °C (II)). The ratio of components by weight: 50% gypsum, 25% PC and 25% additives or 12.5 + 12.5% powder + perlite (III). The tests were performed on standard beams measuring 4x4x16 cm. Unloading of products was carried out after 24 hours. After that, the products are air-dried for 3 days and dried at a temperature of 70 °. In the manufacture of the products, we encountered difficulties in selecting the binding water ratio. The samples turn out to have a clearly visible structure. The addition of the powder allows us to replace perlite and improve GW performance. Further improvement of water resistance is carried out in the direction of increasing the water resistance of the powder and replacing the powder with expanded granules (IV) of the same composition. The resulting filler in the form of powder does not meet the requirements for water resistance, although it has good results in the gypsum product itself. Granules of a new material with a light weight, strong and dense shell and sufficient water resistance were obtained on the basis of the obtained powder and liquid glass. Granules are more resistant to water (than dust), which allows to reduce the density of products. [4]

## DISCUSSION

The substances obtained by burning gypsum rocks are traditional mineral binders and have been known to mankind for thousands of years. Gypsum binders are widely used not only in plastering, but also in the manufacture of bulky building materials. The raw materials used in the production of binders are natural rocks (gypsum rocks, anhydrite), as well as industrial wastes containing calcium sulfate (wastes from the production of phosphogypsum, borogyps, sulfur). There are a total of 35-40 million tons in the world. Gypsum binders are produced, 90% of which are used in construction. The United States, France, the United Kingdom, and Spain are the largest producers of gypsum binders.

Production of gypsum binders in Uzbekistan is well developed in Bukhara and Fergana regions. In Tashkent, Fergana and Samarkand regions a lot of work is being done on the production of gypsum using industrial waste.

Gypsum has a special property - when heated, the chemically bound water separates from the crystal lattice, forming a semi-aqueous gypsum. Such gypsum can be easily crushed. Conversely, when water is added, the mineral binds it to the crystal lattice and restores the gypsum to its original strength. Gypsum is one of the oldest building materials. Its white color, its ability to harden when combined with water, its ability to give a hardening composition of any shape have long been used by builders and sculptors. For them, it is the main working material. Due to its rapid strength and ability to take the desired shape, the material itself plays an important role in medicine due to its high level of environmental friendliness. Formerly known as alabaster, it has been widely used in the manufacture of repair and construction work all over the world - for interior decoration, interior decoration in the form of hat molds on ceilings and walls. [1]

The ancient Egyptians discovered this unique property of gypsum in 3700 BC. The Greeks later gave the mineral the name Gipros, meaning "boiling stone." The Romans brought the knowledge of gypsum to Europe, and in the 15th century gypsum began to be widely used as gypsum. In order for the gypsum stone to become a binder, it is heat-treated, in which case dehydration occurs. Under normal conditions, water is released in the form of vapor, which can be obtained in the form of droplets at elevated pressure. Such crystalline water is the purest in nature, and gypsum binder, like all products based on it, is a very environmentally friendly, non-combustible building material.

According to the heat treatment conditions, gypsum binders are divided into two groups: 1) low flame and 2) high flame. Low-refractory gypsum includes construction, molding, high-strength gypsum and gypsum-cement-pozzolanic binders.

Depending on the time of hardening and hardening, gypsum binders are divided into: A - fast hardening (2-15 minutes); B - normal hardening (6-30 min); B - slow hardening (20 minutes or more).

Depending on the degree of grinding, the binders of coarse (I), medium (II) and fine (III) grinding differ. The marking of the gypsum binder contains information about its main properties. For example, G-7-A-II means: G - gypsum binder, 7 - final compressive strength (in Mpa), A - fast hardening, II - moderate grinding. When gypsum binder powder is mixed with water (50-70% of gypsum mass) it forms a plastic paste that sets quickly and hardens. It turns out to be a gypsum stone, the strength of which increases as it dries. It should be borne in mind that the volume of gypsum increases by 0.3-1% during the hardening process, and this should be taken into account when preparing products by pouring into molds. [1]

## **CONCLUSION**

In conclusion, the disadvantages of gypsum products were brittleness and hygroscopicity, but modern technology has allowed gypsum binder-based materials to provide sufficient strength and water resistance. In this production, the molecular compression technology of the substance is used, in which gypsum has special properties - it is very durable and stops contamination. No special additives, components or additives are required. Due to the molding method used, a significant compression of the internal structure of the tile is achieved 1.67 times.

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# DEEP LEARNING ALGORITHMS

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## ANNOTATION

Deep learning has gained massive popularity in scientific computing, and its algorithms are widely used by industries that solve complex problems. All deep learning algorithms use different types of neural networks to perform specific tasks.

**Key words:** *intellectual services, automation, voice recognition, deep learning algorithms.*

## Introduction

Deep learning uses artificial neural networks to perform sophisticated computations on large amounts of data. It is a type of machine learning that works based on the structure and function of the human brain.

Deep learning algorithms train machines by learning from examples. Industries such as health care, eCommerce, entertainment, and advertising commonly use deep learning. While deep learning algorithms feature self-learning representations, they depend upon ANNs that mirror the way the brain computes information. During the training process, algorithms use unknown elements in the input distribution to extract features, group objects, and discover useful data patterns. Much like training machines for self-learning, this occurs at multiple levels, using the algorithms to build the models. Deep learning models make use of several algorithms.

While no one network is considered perfect, some algorithms are better suited to perform specific tasks. To choose the right ones, it's good to gain a solid understanding of all primary algorithms.

Here is the list of top 10 most popular deep learning algorithms:

1. Convolutional Neural Networks (CNNs)
2. Long Short Term Memory Networks (LSTMs)
3. Recurrent Neural Networks (RNNs)
4. Generative Adversarial Networks (GANs)
5. Radial Basis Function Networks (RBFNs)
6. Multilayer Perceptrons (MLPs)
7. Self Organizing Maps (SOMs)
8. Deep Belief Networks (DBNs)
9. Restricted Boltzmann Machines (RBMs)
10. Autoencoders

Deep learning algorithms work with almost any kind of data and require large amounts of computing power and information to solve complicated issues. Now, let us, deep-dive, into the top 10 deep learning algorithms.

GANs are generative deep learning algorithms that create new data instances that resemble the training data. GAN has two components: a generator, which learns to generate fake data, and a discriminator, which learns from that false information.

The usage of GANs has increased over a period of time. They can be used to improve astronomical images and simulate gravitational lensing for dark-matter research. Video game developers use GANs to upscale low-resolution, 2D textures in old video games by recreating them in 4K or higher resolutions via image training.

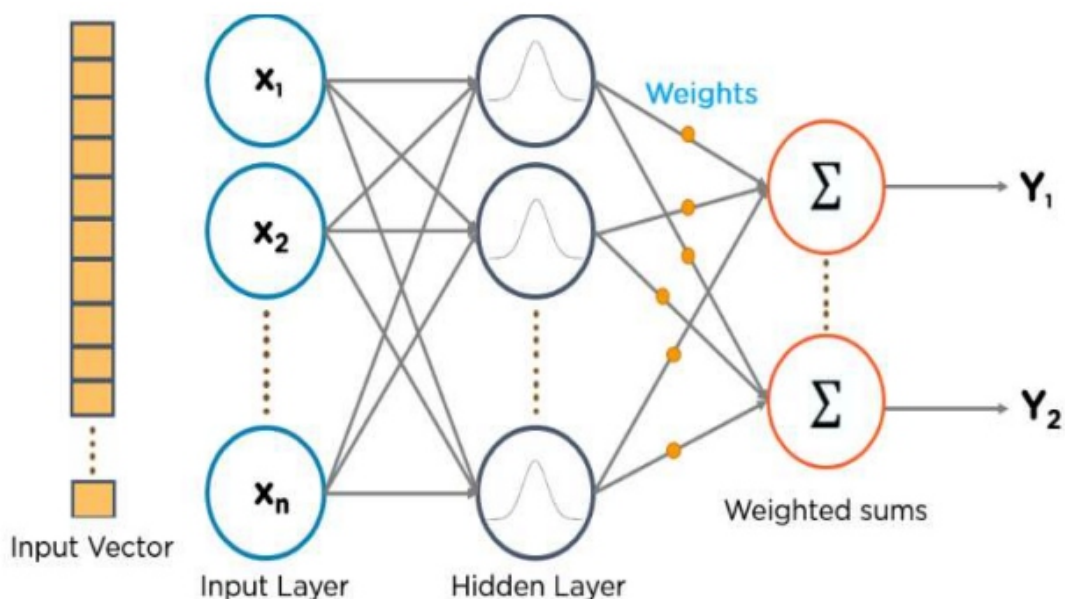
GANs help generate realistic images and cartoon characters, create photographs of human faces, and render 3D objects.

RBFNs are special types of feedforward neural networks that use radial basis functions as activation functions. They have an input layer, a hidden layer, and an output layer and are mostly used for classification, regression, and time-series prediction.

#### HowDoRBFNsWork?

- RBFNs perform classification by measuring the input's similarity to examples from the training set.
- RBFNs have an input vector that feeds to the input layer. They have a layer of RBF neurons.
- The function finds the weighted sum of the inputs, and the output layer has one node per category or class of data.
- The neurons in the hidden layer contain the Gaussian transfer functions, which have outputs that are inversely proportional to the distance from the neuron's center.
- The network's output is a linear combination of the input's radial-basis functions and the neuron's parameters.
- RBFNs perform classification by measuring the input's similarity to examples from the training set
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- The network's output is a linear combination of the input's radial-basis functions and the neuron's parameters.

See this example of an RBFN:



## Multilayer Perceptrons (MLPs)

MLPs are an excellent place to start learning about deep learning technology.

MLPs belong to the class of feedforward neural networks with multiple layers of perceptrons that have activation functions. MLPs consist of an input layer and an output layer that are fully connected. They have the same number of input and output layers but may have multiple hidden layers and can be used to build speech-recognition, imagerecognition, and machine-translation software.

### HowDoMLPsWork?

- MLPs feed the data to the input layer of the network. The layers of neurons connect in a graph so that the signal passes in one direction.
- MLPs compute the input with the weights that exist between the input layer and the hidden layers.
- MLPs use activation functions to determine which nodes to fire. Activation functions include ReLUs, sigmoid functions, and tanh.
- MLPs train the model to understand the correlation and learn the dependencies between the independent and the target variables from a training data set.

Below is an example of an MLP. The diagram computes weights and bias and applies suitable activation functions to classify images of cats and dogs.

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# MANAGEMENT PROBLEMS IN THE DIGITAL ECONOMY

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## **ABSTRACT**

*Industry 4.0, digitalization and artificial intelligence are the most talked about factors affecting the competitiveness of companies in the innovative future. This study sheds light on the relationships between these industries from the perspective of managing industrial companies, revealing problems from a theoretical and practical perspective. The most important questions are: to what extent are organizations preparing for the digital future? What are the differences between the problems of multinational companies (MNCs) and small and medium enterprises (SMEs)? How do managers prepare for change, and what changes are they making when they keep in mind the concept of “smart” technology? This study demonstrates the results of a qualitative study conducted in 2018–19 using in-depth interviews with 195 top managers of MNC and SMEs (NVivo 12 was used to analyze responses). The results show that even if managers see and feel emergency challenges, they do not deal with additional requirements other than technical developments. Solving human problems is the most serious task; however, managers are constantly delaying decisions related to these issues. In general, even in the largest companies, managers are unprepared for changes or new leadership styles that are relevant to the digital future.*

**KEYWORDS:** *Digitization; Industry 4.0; Leadership; Management skills; Against SME transnational companies.*

## **Introduction**

The importance of the digital economy theme is evident in the Google search engine; Can find 823,000,000 problems in 0.44 seconds. The development of digitalization in the last few decades has led to 4 industrial revolutions. This revolution, known as Industry 4.0 (I4.0), was a major issue discussed at the World Economic Forum in January 2016 in Davos, Switzerland. Klaus Schwab, an engineer and economist, founder and president of the World Economic Forum, announced. this revolution will radically change our way of life. I4.0 aims to combine the strengths of traditional industry with modern Internet technologies. According to experts, this industrial revolution is based on the Internet, which allows communication between people and cyberphysical systems through large networks. The scientific literature is trying to define a list of components that are trying to give a clear definition of the revolution, such as Internet Things (IoT), CPS, Smart Factory, etc. Artificial Intelligence (AI), Cyber Physical Systems and Industrial Internet links There are definitions that include. According to the original German terminology, this digital transformation / revolution takes place in the value creation processes of companies. In the first few years of the revolution, researchers focused on technical solutions, identifying new business models, innovations, renewable resources, and smart services now connected to I4.0. . There are a number of other approaches that do not necessarily reflect the same point of view. However, there are several scientific publications that clearly outline the role, responsibilities, and professionalism of leaders. If scholars are reminded of the importance of this leadership, the issue will be discussed in a general context. Accepting and managing change is a challenge in itself; however,

new competitors, new strategies, and the hopes of different generations create new challenges for leaders and create an uncertain and uncertain environment. As I4.0 is primarily focused on technical development, it is not clear what knowledge and skills are required of leaders who want to succeed in this new era. According to Bowles' recommendations, the following competencies and qualities are required: critical thinking, collaboration, creativity, communication skills, curiosity, perseverance, initiative, and social sensitivity. Batisti's study and others are areas where leaders in the digital world need to think differently: responsibility, results, dissemination, goals, evaluation, mistakes and conflicts, change and innovation.

The "Industry 4.0: Digital Enterprise Building" study by PwC shows that the technology needed to implement I4.0 is ready; the problem is the lack of digital culture, the lack of vision and training and the lack of professionals we felt the importance of filling the existing gap in the scientific literature by conducting research focusing on the professional competence, knowledge, vision and hopes of leaders problem. The second problem identified in practice is the practical problems that managers face in the transformation process and the lack of a methodology to address the problems. The third problem in practice is people. Personnel and management in general is one of the main challenges for I4.0, as new skills, attitudes, and attitudes are required for both employees and managers. To prepare for the transformation, not only operators and technical systems, but also managers need to get acquainted with new requirements, new ideas, tools, business models, new relationships with customers and partners. This is called Leadership 4.0. Finally, the fourth problem is that the above-mentioned study focuses only on Western countries, not the Middle East-Europe.

The purpose of the study was to communicate with company executives to determine what they need to be prepared for, and to prepare questions on how well they are prepared for future changes in terms of their current leadership skills and evaluation.

The research questions are structured as follows:

Q1: How ready are organizations for the digital future?

Q2: Apart from technical changes, what is the biggest challenge for management?

Q3: What is the difference between how multinational companies and SMEs are perceived?

Q4: Are there any generational problems related to digitalization, and if so, how do managers solve them?

Q5: What changes are needed and how do managers prepare for the concept of "smart"?

All of the above research and the results show that the world is preparing for the challenges of a new industrial revolution. However, a lack of organizational culture is a major barrier to corporate success.

The results of our research show that in theory, managers are aware of the urgency they face, but they are not properly prepared. They do not engage in tasks that involve re evaluating their management performance primarily in terms of soft categories (motivation, integrated conflict management, skills development, teaching, leadership change, culture formation, etc.).

The purpose of the study is to make comparisons that have not yet been the subject of research in the literature. The impact of the German economy on Europe is unquestionable. We wanted to show the emergence of this dominance over other countries, where German property comes first in terms of investing in each country and producing value added. The study of economic domination and the implementation of its decisions in terms of I4.0 and digitization provides additional ideas for practical life in addition to a theoretical approach to results. There are significant differences between this study and previous studies, where most of the methods were conducted using questionnaires, mostly involving the United States, Indonesia, and Germany. In practice, no comparative analysis was found for the countries we reviewed. Similar questions regarding digitization and I4.0 interpretation can be read in

in previous research, but the focus, purpose, and questions are different. It is interesting and superior to previous research, especially the comparison of leadership perspectives and future values in the three countries.

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# HACKING METHODS AND THEIR PROTECTION MEASURES

JURAYEV DIYORBEBEK UMIDJONUGLI

## ABSTRACT

*The article is devoted to methods of computer hacking and ways to prevent them. The motives pursued by hackers by carrying out this or that illegal act are investigated. The focus of the work is on the types of hacker attacks, as well as the rules that will protect the average user from computer hacking.*

**KEYWORDS:** *hacking, software attacks, methods of computer hacking, computer technologies, information security*

## Introduction

The intensive development of modern society in the world has led to the global spread of new information technologies (IT) in various social spheres. The emergence of the hacker subculture was carried out in parallel with the formation of the World Wide Web. However, the Internet has become not only an arena for testing the most formidable forms of computer viruses, but also a place from which it has become possible to hack computers that are currently online, from where you can simply steal valuable information. Today, modern society has finally recognized the importance of solving the problem of protecting computer data. IT has radically changed the daily lives of millions of people. They have become an integral part of not only the economy, medicine, educational activities, but also other areas of human life. In countries with a high level of computerization, the issue of combating computer crime has long been one of the central problems [2]. It was with the development of computer technology that the first hackers appeared, such a direction of computer activity as hacking was born - computer hacking, the task of which is to gain access to confidential information stored in electronic form, and its further destruction, disclosure, modification or copying, that is, the implementation of unauthorized intrusion into the information system solely for criminal purposes.

**Materials and methods:** In order to understand the purpose for which this or that act of hackers is carried out, it is necessary to understand the motivation that prompts them to commit illegal actions. Consider the main motives of crackers [6]:

1. Gaining Attention: Once a system is compromised, hackers brag about their victories in an effort to earn "status in society" because any computer that has access to the Internet is a potential target for attack.
2. Greed: The main target of hackers is sites containing important information in order to obtain money, services or any data.
3. Malicious intent: in this case, the main goal of the attack is to harm a specific site or organization, the result of which is to cause significant damage to the system without official access to it.

Software (SW) of any computer system consists of 3 elements: operating system (OS), network software (SW) and database management system (DBMS). Based on this division, all attempts to hack computer systems can be divided into 3 groups: 1. Attacks at the DBMS level. Due to the fact that the DBMS has a conditional internal structure, and the procedures for its elements are specified quite precisely, protecting the DBMS is one of the simplest tasks. In addition, there are two peculiar attack scenarios on the DBMS: 1) the results of arithmetic operations on the numeric fields of the DBMS are rounded down, and the difference between them is added to some other DBMS record [5];

2) a hacker gains access to the fields of records of database management systems, for which only statistical information is open. The idea of hacking in this case is as follows: it is necessary to formulate the query in such a clever way that a lot of structured records are formed into one [3].

2. Attacks at the OS level. As for the issue of protecting the operating system, here the prevention of unauthorized access is much more difficult than in the DBMS. This is due to the fact that the internal configuration of modern operating systems is very complex, which is why compliance with the security policy is a rather difficult and important task. Many people are mistaken when they say that attacks on operating systems organized by hackers are carried out only with the help of the most sophisticated means based on the latest achievements of science and technology. However, the art of a hacker is that it is necessary to be able to find a weak spot in a particular protection system. At the same time, the simplest methods of hacking to this day do not give way to the most sophisticated, because hackers use a certain rule: the more elementary the attack algorithm, the higher the probability of its completion without errors and failures. Any operating system can actually be subject to the following attacks [4]: 1) password theft (when a user enters a password, an attacker can spy on it); 2) obtaining a password from a file or any paper media; 3) theft of a material carrier (diskette, electronic key) of password information; 4) enumeration of all possible password variations; 5) selection of a password by the frequency of occurrence of characters; 6) scanning of computer hard drives; 7) launching the program on behalf of a user with the necessary authority; 8) conversion of the code or data of the security subsystem of the OS itself; 9) denial of service, in order to disable the OS; 10) request bombardment and more. It is worth considering the fact that if the system administrator strictly adheres to the security policy of the computer system, then all of the above attacks are ineffective, although it is impossible to completely eliminate the threat of hacking at the operating system level.

3. Attacks at the level of network software. The most vulnerable piece of software is open source software. This is due to the fact that the communication channel through which various messages are transmitted is usually not secure, and anyone who has access to this channel can intercept and modify messages. In this regard, the following hacker attacks are distinguished: 1) listening to a local network segment; 2) intercepting messages on the router or creating a false one; 3) imposing messages; 4) denial of service. Since hacker attacks are provoked by the openness of network connections, it is reasonable to assume that in order to repel such attacks, it is necessary to protect communication channels as much as possible. Having studied the methods of computer hacking, we emphasize that in order to prevent it, it is necessary to adhere to the following rules. First, keep your operating system and web browser up to date as hackers attack when vulnerabilities exist. Secondly, it is worth installing a firewall (software that checks data received via the Internet or a network and blocks or allows it to the computer) and an antikeylogger (keylogger protection module) to prevent external unauthorized access.

## **CONCLUSIONS.**

It's best to buy or download antivirus software, change passwords monthly, and delete emails from unknown senders. Not everyone can know that they have been hacked. Therefore, you should always be aware of how your computer works and what programs are installed on it, since there is always a risk of hacking, even if the above rules were followed. Hackers are smart and constantly come up with new methods of hacking; these are highly qualified specialists, since it is their actions that pose the greatest threat to the security of computer systems. Information security of computer networks and individual computers is achieved through a unified policy of protective measures, as well as a system of measures of a legal, organizational and engineering nature.

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