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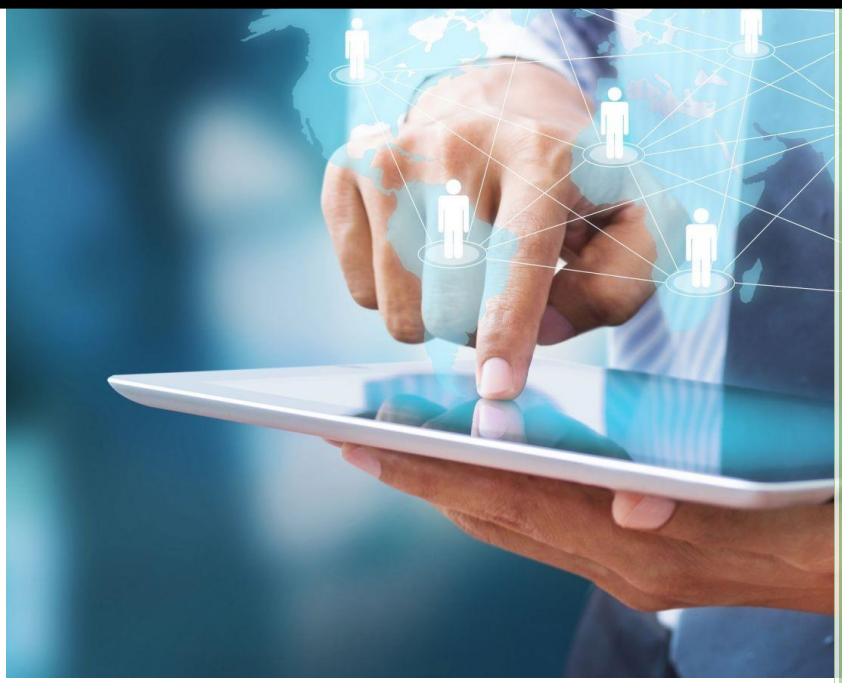

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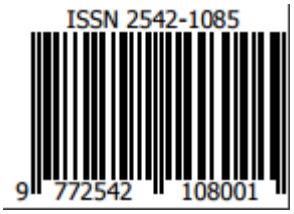

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Environmental Risk Assessment

UDC 66.01
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Bashirov V.D., Korotkov V.G., Sagitov R.F., Vasilevskaya S.P., Voloshin E.V., Utyaganova Z.Z. Integrated waste management by chemical production of composite materials extrusion

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Abstract: Currently in Russia great attention is paid to the disposal and recycling of industrial and domestic waste. In various industries at the present time is accumulated and not recycled, a huge amount of waste. The bulk of food production waste (brewer's grain, distillery stillage, husks), or simply drained, in connection with impossibility of the enterprise to process or used as fuel (husk). If we talk about the timber industry and its wastes (chips, shavings, sawdust), you should also recycling these wastes are not. This may also include and waste polymer materials, which every year becomes more and more. The relevance of the use of waste food and wood processing, plastic industries, construction materials and articles associated primarily with the problems of preserving the environment - they are not subject to rot, corrosion, but also with the problem of resource conservation. Currently, widespread use of waste polymers in building materials industry, is also quite acute problem is disposal of waste food and wood processing industries are Particularly promising direction of recycling is obtaining highly filled plastics that can be used as composite construction materials. A promising method of obtaining high-quality extrudate is extrusion process using a single screw press because of the simplicity and reliability of its design. Despite long-term use of screw presses for the production of multicomponent mixtures, especially for highly filled plastics: technological forming process is studied in them is not enough, there are no universal methods of calculation of screw presses for production of highly filled plastics, so the research and study of the extrusion process in screw presses is important and promising.
Keywords: extrusion, household waste, industrial waste, auger, highly filled plastics.

1.Introduction

In various industries of Russia now accumulates and is not a huge amount of waste recycled. The bulk of waste — waste chemical production, in particular polymeric materials. Collection and processing of polymeric materials are not properly carried out, all polymer wastes accumulate in landfills and have a long period of decay. In the Orenburg region waste petrochemical industry also constitute a significant segment in the field of waste resulting from the activities of this group of enterprises. Sufficiently strong argument for the speedy and complete as possible recycling is that, as a rule, are highly toxic petrochemical waste and pose a serious threat to the environment [1,2].

Based on the analysis of modern literature [1,3], it was concluded that there are two main ways of recycling and recycling of household and industrial wastes of various industries based on polymers:

1) The use of the polymers as fillers and additives in various industries;

2) thermal method of disposal. The second method is used mainly in industry hi¬micheskoy [4].

In various kinds of industry, the most widely spoken first method. One of the special cases — is to fill a variety of polymer components [5-6].

The technological process of adding filler to the polymer nazyvaet¬sya content. The filler content can vary widely prede¬lah, most often it is 40-50%. Plastics filler content in which three or more times greater than the polymer content are called highly filled plastics [7].

Recognize the three main ways of filling polymer [8]:

1) Mechanical mixing of the polymer with fillers.

2) Precipitation from a solution of the polymer on the filler surface.

3) Polymerization content.

An example of the first process for preparing highly filled plastics is shown below.

All steps of the production process of DNPK inseparable profile and mainly running on a single continuous line as follows:

— Chopping wood
— Drying of crushed wood (if necessary)
— Dosing of components
— Mixing of the components
— compounding
— Dosing of compound
— Molding products
— Trimming the length and width of the division (if required) [8].

Table 1

Number of waste by hazard class, used and disposed of businesses owners in % in the period from 2005 to 2012 [3-8]

Hazard class Year	I	II	III	IV	V
2005	-*	-*	-*	-*	-*
2006	25,9	5,8	1,6	4,0	16,5
2007	0,1	4,7	7,0	13,2	8,1
2008	0	0,1	96	71,3	11,1
2009	-*	-*	-*	-*	-*
2010	-*	-*	-*	-*	-*
2011	221,9	0,1	123	-*	-*
2012	-*	-*	-*	-*	-*

Note — * data in the press are not available or can not be found, for reasons beyond the control of the authors

2.Materials and methods

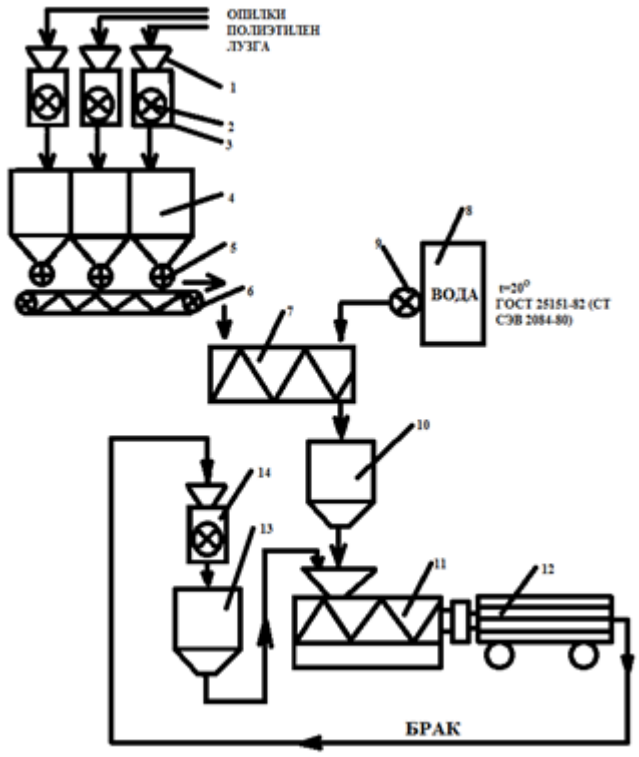
Another group consists of food production waste (spent grains, distillery grains, husk), less toxic, but large in terms of education. These wastes or simply merge, due to the inability of the enterprise process it, or used as a fuel (husk), the products of combustion which pollute the environment. If we talk about the timber industry and its waste (chips and sawdust), it is also proper recycling of this waste is not [4,5].

Relevance of integrated waste management by recycling chemical industries in the building materials and related products primarily to the problems of preserving the environment — they are not subject to rotting, corrosion, but also with the problem of resource. Especially promising direction is to obtain utilization of highly plastic, which can be used as building composite materials. It is known that the main aggregates to produce composite materials are screw presses (extruders) [7].

To this end, we have developed an integrated approach to waste management of chemical plants, food and wood processing industry by manufacturing composite materials by extrusion.

We have proposed technological scheme for environmentally sound waste material based on chemical, food and wood industries extrusion (Figure 1).

3.Results and Discussion



1 — boot device; 2 — sawdust crusher for crushing the LSC-1 (0.2 t / h, 7.5 kW); Crusher for crushing polyethylene MS-500 (180 kg / h 11 kW); crusher for crushing the husks PF -1007 (1000 kg / h, 37 kW); 3 — dispenser; 4 — intermediate hopper; 5 — dispenser; 6 — screw feeder; 7 — mixer; 8 — container; 9 — dispenser; 10 — container otvolazhivaniya; 11 — screw extruder press (180 kg / h, 7.5 kW); 12 — trolley for storage and cooling of finished products; 13 — intermediate vessel; 14 — crusher for crushing marriage RS-500 (180 kg / h, 11 kW)

Figure 1 — Flow diagram for production of ecologically safe material on the basis of chemical waste by extrusion

The proposed technology can be estimated coefficient of low-waste technology proposed $K_{МПТ}$:

$$k_{МПТ} = (K_{ПЕР.СЫР.}/K_{ОБЩ.ПОЛ.ПРОД.}) + K_{НЕК.ПОЛ.ПРОД.},$$

где: $k_{МПТ}$ – ratio of low-waste technology proposed;

$K_{ПЕР.СЫР.}$ – amount of feedstock;

$K_{ОБЩ.ПОЛ.ПРОД.}$ – the total amount of product obtained;

$K_{НЕК.ПОЛ.ПРОД,}$ — the total amount of the product obtained from substandard raw materials.

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Human-Computer Interaction

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Gorelov A., Terteryants A., Khmelev G. Human-computer interaction as a multidisciplinary field of science

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Abstract: The article deals with an ongoing problem of human-computer interaction. Human-computer interaction becomes an integral part of many developments, although not always it is given a high priority. The universal use of various computer processing and content creation leads to the fact that a creative activity attached masses of people.
Keywords: human-computer interaction, human factor, computer factor, e-learning, control systems

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1. Introduction

Human-Computer Interaction is research, planning and development of interaction between people (users) and computers. Very often it is regarded as a set of computer science, behavioral science, engineering, and other fields of study. The interaction between users and computers occurs at the user interface (or interface), which includes hardware and software; for example, images or objects displayed on the screen, the data received from the user via hardware input devices (such as keyboard and mouse) and other user interaction with large automated systems, such as aircraft and power plant.

Association for Computing Machinery examines human interaction and the computer as a discipline engaged in the design, evaluation and implementation of the work of interactive computing systems for human use, as well as the study of the processes. An important aspect of human-computer interaction is to ensure satisfaction of users.

Due to the fact that human-computer interaction is studied as from human side and the computer

one, the knowledge gained in the course of the study, is based on human factor, and on computer factor. On the computer side important computer graphics technology, operating systems, programming languages and development environments are important. On the human side — communication theory, graphic and industrial design, linguistics, sociology, cognitive psychology and human factors such as a user satisfaction. Also engineering and design are important. Due to the interdisciplinary nature of the human-computer interaction of people with different skill levels contribute to its success. Sometimes, human-computer interaction is called as a man-machine interaction and computer-human interaction.

Until the late 1970s, the only humans who interacted with computers were information technology professionals and dedicated hobbyists. This changed disruptively with the emergence of personal computing in the later 1970s. Personal computing, including both personal software (productivity applications, such as text editors and spreadsheets, and interactive computer games) and personal computer platforms (operating systems, programming languages, and hardware), made everyone in the world a potential computer user, and vividly highlighted the deficiencies of computers with respect to usability for those who wanted to use computers as tools [1].

Initially, the main focus of research of human-computer interaction has been the user's physical interaction with a computer or other device. Studied model of human motion, for example, parameters such as the time required clicking an object of a certain size or speed input text using the 12-button mobile phone keypad.

With the development of human-computer interaction the focus shifts towards the study of the human mind, how a person understands and recognizes objects and processes.

2. Materials and methods.

Today, human-computer interaction became a multidisciplinary field, growing at a tremendous

speed. Specialists on human-computer interaction work in virtually all computer and networking companies, since such a huge role to play hypostases of human-computer interaction as usability and friendliness. They are important not only for the use of computers and consumer electronics, so there is nothing surprising in the fact that human-computer interaction experts appear even in companies producing household appliances such as microwave ovens and washing machines. The role of these professionals grows within organizations; they need to improve the efficiency of management, collaboration, and workflow. As a result of human-computer interaction becomes an integral part of many developments, although not always it is given a high priority.

An important role of human-computer interaction lies within ongoing spread of e-learning. In the study of the educational environment is possible to allocate how electronic educational models are modified as they convert the process of learning organization. Generalization of works that represent the organization of the e-learning environment suggests three basic types of models. The first type of E-Learning environment is associated with the first generation of Web. This model slightly changes the traditional teaching; the essence of it is that the electronic environment allows teachers to move to electronic teaching mode by downloading slides, assessment tests and other electronic materials. The second type of model is a result of rapid development of the information environment. This model shifts the focus on a virtual nature of learning. The third type of model is related to the development of the social context of learning [2-4].

The use of e-learning covers the situation where the student independently learns the material through work and interaction in electronic information and educational environment. An example of such learning can be the development of massive open online courses in which a contact with teaching staff of a particular student can be completely eliminated, but made up for by interacting with the community involved in the electronic information and educational environment [5-7].

E-learning has several advantages over the traditional: 1) freedom of access – a student can

practice almost anywhere; 2) reduction of educational costs – student bears the cost of storage media, but does not of costs of methodological literature; 3) flexibility of learning – duration and sequence of materials study; students choose by themselves, adapting the whole learning process to fit their capabilities and needs; 4) e-learning users develop their skills and knowledge in accordance with the latest modern technology and standards, updating learning materials; 5) equal educational opportunities – learning becomes independent of the quality of teaching in a particular educational institution; 6) ability to define criteria for assessing knowledge [8-10].

The trend of network connection of all devices to enhance their consumer qualities gave rise to the term *hyperconnectivity*. Today in the multiplayer mode almost all computers work, many phones and game consoles, as well as some other devices; in the near future will join televisions en masse, camcorders, home appliances. As a result, the number of devices and applications connected to the network far outweigh the number of people using the network for data transmission. With increasing extent of connection and growing amount of information about our lives, stored in electronic form, from personal photos and protocols of social networking to detailed summaries of actions and statements by the representatives of all levels of government and business. What is important is not only the fact of fixing the information in the electronic memory, but also its accessibility. Finally, the universal use of various computer processing and content creation leads to the fact that a creative activity attached masses of people, and not only professional artists, writers, journalists, musicians, photographers, directors and designers. The availability of creative concerns and research activities, a large number of interested users involved in research. It is important to remember that all of these changes are not an end in itself, they are needed for people. Human-computer interaction is not necessary to make it easier for a person to communicate with a computer, it is only a means. The focus should not be on technology, but on what has the true value — our daily life, work, family, health, education, communication with the public and mutual support [11].

3. Results and Discussion

Inherent to new technique fleeting complex processes with a large number of varying parameters, which need to be monitored and taken into account in control, demanded by human perception of such speed and processing of current information, which in some cases exceeded its capacity. The man in the management process of such systems sometimes simply physically could not cope with all the emerging challenges before him. If, moreover, we consider that such problems had to be solved in the unusual conditions of life, in conditions of high responsibility for the success of the operation, the high price errors, it becomes obvious how much human living conditions has changed in the new control systems.

Thus, with the advent of new, modern technical systems dialectical leap was discovered that has led to the emergence of a qualitatively new working conditions under which a person could not even with the mobilization of all their compensatory abilities to successfully solve tasks assigned to it. Hence followed an important conclusion: the reason for the low effectiveness of new technology was not the man who let his mistakes to its successful implementation, and the technique that was created without taking into account psychophysiological human capabilities to manage it and actually provoked his mistakes. So there was a need for a special study of the psychophysiological characteristics of human activities and the new complex technical systems, exploring its capacity to resolve problems arising in it to take account of these data in the design of systems and operator training for management.

So on the brink of psychological science and technology originated a complex of special theoretical and applied problems, without the authorization of which was impossible to create new combined systems, human-machine that can effectively resolve their assigned tasks. To address this range of problems, and formed a new scientific direction in psychological science, called engineering psychology.

In the historical development of human computer can be regarded as new sophisticated weapons, mediating human mental activity, which transferred executive intelligence. The relatively basic kinds of mental activity, with predominantly stereotyped character, a computer can replace the man, forcing him out of the implementation of these activities; while a computer can be transferred to the components of the creative process. In more complex, dynamically changing forms mental activity, characterized by the emergence of new problematic situations, the computer intelligent functions are transferred only partially and problem-solving functions are distributed between man and computer [12-14].

Instrumental computer mediation is a dynamic process that is associated with the change of types of computers and their programs, programming languages, which leads to a change in the nature of performing the functions referred to it and components activities, remaining a man, activating, making changing in historical terms and the process of transformation of mental processes and human properties. Transmitting intelligence computer accounting program for it, the man on the stage of preparation of acomputer as an instrument plays a leading role. The next step in functional performance of the computerized activity the person in relation to the computer as an instrument can perform a subordinate or a leading role or dynamically change the role in the long-term work with it.

Thus, it has become clear that computerization can lead not only to a positive, progressive changes in human life, but also provoke negative changes, such as reduction of human intellectual activity, reduction in the activities of creative components and increase in stereotypeness.

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UDC 004.5
Publication date: 08.02.2017

Mishin N., Aliev M., Korotkov I. Some fundamental aspects of human-computer interaction

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Abstract: The article discussed some challenges in the development of human-computer interaction. Techniques, outlining the art of designing human-computer interaction are outlined. Seven principles of user interface design are considered. Various methodologies which determine the methods of human interaction with computer are analyzed. The authors come to the conclusion that usability and utility are equally important, no matter the subject of use is
Keywords: human-computer interaction, intuitive interface, interface design, descriptive and predictive models, approaches to the design

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1. Introduction.

One of the key success factors of software in the contemporary world is its user-friendliness. The paradigm of software development has recently undergone considerable changes. A growing number of time and resources are invested in the creation of friendly interface that allows users to carry out assigned tasks quickly, easily, and without noticing technical aspects of a system operation.

Approaches to the design of software developed evolutionarily:

Machine-centric approach. It was generally accepted at the beginning of the emergence of technical systems. Users were trained programmers specialists. The man in this system was seen as its element to solve various problems.

Anthropocentric approach. The essence of this approach consisted in that the machine is an instrument of labor, and the key in the design of such systems is the analysis of operator's

activities. However, the approach was too psychologized. The key role was rendered to engineering psychologists who being specialists in their field were not those in the field of technology.

System-technical approach. It appeared almost simultaneously with the anthropocentric one. The roles between human and machine were equalized. The approach practically failed to develop, as engineers, who have played a leading role, were not experts in psychology and often ignored psychological knowledge [1-4].

Human-oriented approach. It came as less radical form of anthropocentric approach, it set what needs, goals, and abilities of a person should be considered.

Human-computer interaction studies in what ways people work with computers and how computers should be designed in order that they could be used with maximum efficiency.

Thus, in the process of human interaction with computer engineering psychology focuses more on human study of its characteristics and needs, and ergonomics on account of these factors in the design of human-machine systems. In addition to psychological factors, ergonomics is also increasingly takes into account a number of other parameters such as physiological and motor characteristics of man and tension indicators.

Human-computer interaction is often considered as a sub-section of ergonomics, concentrated on the interaction between humans and computer. However, some experts share ergonomics, which is engaged in designing machines, indicators, that is, to a greater extent objects of physical world, and PCI-centered UI designed.

Quite often one can hear the expression *intuitive interface*. This notion implies that it is possible to design something so well that people, for the first time seeing this, will know how to use it. When someone speaks of an intuitive interface, it should be understood as an interface

corresponding to the previous user experience. Only if a user already has life experience with the same or similar product or class of similar products, there will be an intuitive understanding present [5-7].

2. Materials and methods.

The main objective of human-computer interaction is the improvement of interaction between humans and computers by making computers more usable and receptive to user needs. In particular, human-computer interaction deals with:

— methodology and development of interface design;

— methods of implementing interfaces;

— methods for the evaluation and comparison of these interfaces;

— developing new interfaces and interaction techniques;

— developing descriptive and predictive models;

— interaction theory [8-9].

The long-term objective of human-computer interaction is the development of the system, which will reduce the barrier between the human cognitive models of what they want to achieve, and understanding of the computer assigned tasks.

Specialists of human-computer interaction are, as a rule, developers involved in practical application of design techniques to real global issues. Their work often deals with the development graphical and web interfaces.

Researchers of human-computer interaction are involved in the development of new design

techniques, experimentation with new hardware devices, prototyping new software systems, exploring new frameworks for interaction and development of theories and models of interaction.

In the study of personal information management, human-computer interaction is extensive in the information environment, people can work with various forms of information, some of which are computer forms, some are not to understand and effectively influence the desired changes of their environment. In the field of computer-supported collaborative work emphasis is on the use of computer systems to support collaborative work of a group of people. Teamwork management principles expand the scope of computer-supported collaborative work at the organizational level and can be implemented without the use of computer systems [10-11].

A variety of techniques, outlining the art of designing human-computer interaction began to emerge during the development of this area in the 1980s. Most techniques have evolved from the development of user interaction models, developers, and technical systems. Early techniques such as cognitive processes of users treated as a predictable and quantifiable, and offered to developers when designed user interfaces to consider the results of cognitive research in areas such as memory and attention. Current models tend to focus on continuous feedback and dialogue between users, developers, and engineers, and endeavor to ensure that the technical systems are operating in the field of user desires rather than the desires of users in the field of ready-made systems.

User-centric design: development, focused on the user, at the moment is a modern, widely practiced philosophy, the essence of which lies in the fact that users should be central to the development of any computer system. Users, developers and technical experts work together to clearly express the desires, needs and boundaries, and create a system that meets these requirements. User-oriented projects often use ethnographic research environment in which users will work with the system. This practice is similar to, but not a joint development, which emphasizes the ability for users to actively cooperate through meetings and seminars.

Seven principles of user interface design can be considered at any time, in any order during the development time, it is habitualness, simplicity, evidence, admissibility, consistency, structure and feedback [12-14].

In order to assess interaction between humans and computers, Don Norman suggested seven principles. He proposed seven steps that can be used to convert complex tasks. Below are seven principles of Norman:

1. Use both knowledge in world & knowledge in the head.
2. Simplify task structures.
3. Make things visible.
4. Get the mapping right (User mental model = Conceptual model = Designed model).
5. Convert constrains into advantages (Physical constraints, Cultural constraints, Technological constraints).
6. Design for Error.
7. When all else fails – standardize [15].

Various methodologies have materialized since the establishment, which determine the methods of human interaction with computer. Here are some design methodologies:

- Activity Theory: This HCI method, which describes the structure where there is human-computer interaction. Activity theory provides reasoning, analytical tools and projects of cooperation.
- User-Centered Design: It provides users with a central place in the design, where they get the opportunity to work with designers and engineering practitioners.
- Principles of User Interface Design: Tolerance, simplicity, visibility, affordance, sequence, structure and feedback are seven principles used in the design of interface.

- Value Sensitive Design: This method is used for the development of technologies and includes three types of research: conceptual, empirical and technical.
- Conceptual research works on the understanding of the value of investors who use the technology.
- Empirical studies are quantitative and qualitative design research that demonstrates understanding of the designer user values.
- Technical studies include the use of technologies and designs in conceptual and empirical research.

Although the paintings and sculptures appeared earlier, it is the text that is usually regarded as the defining point of civilization; preliterate and oral societies are often seen as the background simply because they do not have history till now.

All these traditional texts have a common linear character. Aristotle in his Poetics says the history should have a beginning, middle and end, and even post-modern non-linear narrative is actually written in a linear order, even though the events may not be causally related [16-18].

3. Results and Discussion.

Application of modern approaches such as the use of gestural input method and the use of augmented reality to create user interfaces is a step to improve the human-machine interaction by increasing the naturalness and usability.

There are many other criteria that determine the usability of the product. One of the main usefulness of this is: whether the product meets the needs of the user? Both usability and utility are equally important, no matter the subject of ease of use, unless it is of no interest to you. It is not a favorable situation as when the system can theoretically do what you need, and in practice is so complicated to use that the achievement of the desired results is simply impossible [19-20].

Computer, information and telecommunication technologies, penetrating into such forms of social communication, like the press, publishing, radio, film, television, are gradually blurring the line between them. There is reason to believe that in the future all of these forms constitute a single, integrated information environment that will provide the entire process of mass communication in society.

Informatization of society based on mass introduction of computer technology is an irreversible process. But it is a process, not a one-time event. Apparently, it will take time before the benefits of computerization begin to be visibly felt. The current stage cannot be identified otherwise than initial. And the objectives of this phase are specific in many ways. Yet to build an infrastructure that meets the objectives of the global informatization. Whatever may seem a daunting task of transferring information from paper-based to computer-based.

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Zubarev I.S. Model diagnostics risk bankruptcy

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Abstract: This article highlights and analyzes new for the Russian Federation bankruptcy individuals. The work presents an analysis of newly introduced controversial provisions of the Law on Insolvency (Bankruptcy), based on the views of reputable lawyers, as well as on the work of academics in the field of law and economics. Also, the author gives a brief description of the most bankruptcy proceedings individual with lingua interpretation of the rules, as required in the law. Drawing a parallel with the legislation of Western countries, discussed the positive and negative aspects of innovation. These features of the legal regulation, and on this basis derived generalizations associated with the objects and advantages of production in individual countries. The basis of the study served as a law "On Insolvency (Bankruptcy)", demonstrated the imperfections of the legal framework, dedicated individuals. As a result of the material, the author concluded that the law is intended to regulate relations between citizens and the lending institutions to a greater extent. However, not all individuals who use innovations amendment in good faith, some not having the status of an entrepreneur can be a member of the cooperative, the shareholder, the owner of the share in the authorized capital of the entity, thereby deliberately expose themselves to action by authorized persons.
Keywords: insolvency, bankruptcy, an individual, the elimination of the debt, the creditor, the debtor, the arbitral tribunal

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1. Introduction.

The priority of any state acts to build a sustainable and stable development of the economic system. A key element of regulation of the economic system is the legislation on insolvency (bankruptcy), which is necessary to regulate the development of the country. An important problem in modern, dynamic economy is a bankruptcy prevention, timely detection and elimination. In the conditions of transformation of economic relations in the Russian Federation is particularly characterized by a high degree of uncertainty, which significantly increases the risk of bankruptcy of airlines as a result of exposure to both external and internal economic factors.

Bankruptcy As a legal instrument of improvement of the economic situation of the subjects of property turnover, primarily aimed at cleansing «economic horizon» from the inability to sustainable management of businesses.

Bankruptcy as a feature of the market mechanism is the most important factor in sound economic development, debt repayment guarantee and strengthen commercial relations. The presence of the institution of insolvency promotes economic recovery, prevent payments crisis and the functioning of insolvent legal persons.

The ubiquity of consumer credit as a major financial «consumer» tool for solving problems of the economy has led to the gradual spread of the regulations on insolvency and non-entrepreneurial attitude, which contributed to unifying the provisions of the insolvency law and the expansion of the subject of legal regulation of competition law, using basically the insolvency criterion.

financial management system at the enterprise must respond quickly to any changes in financial and economic activity of any enterprise, which is especially important in conditions of uncertainty and market instability [1].

2. Materials and methods.

Model diagnostics risk of bankruptcy will allow management to form a strategy and develop operational solutions to assess and improve the economic and financial condition of the company. The use of a number of risk diagnostic models of bankruptcy is not appropriate in terms of the Russian economy for the following reasons:

— The use of different models lead to contradictory results.

— Predictive accuracy of the models is significantly reduced when used for the analysis of

financial condition data for several years prior to the bankruptcy.

— Foreign models do not take into account the specifics of the economic situation and the organization of business in Russia, which differ, including accounting and tax law, which is reflected as in a set of sign-factors, and in the weight coefficients of them.

— In the models used data for one year, and did not take into account changes in the dynamics of indicators in a few years.

— The existing models used in his analysis of a limited range of indicators measuring the liquidity, solvency, profitability and, as a rule, extend or modify the Western models of 60-80 years of the 20th century.

The terms of the factors determining the risk of bankruptcy is much larger, it causes the need to improve its evaluation models by expanding it with additional parameters [2]

The conceptual approach of American law, aimed primarily at protecting the interests of the debtor, may be useful for the Russian legislator with certain modifications and correlations.

We believe that in terms of structural socio-economic crisis, taking place at the present historical stage of development of the Russian state, the uncontrolled flow of consumer credit, a parasite with a geometric progression in the Russian legislation on insolvency (bankruptcy) it would not be superfluous to provide that by analogy with US law , a joint institute of bankruptcy spouses, its purpose is primarily responsible for the increase in their financial situation.

A specific feature of the US bankruptcy system is the participation of special subject — the credit counselor who is assigned in each legal district. During the six months prior to filing an application for bankruptcy citizen must hold a conversation with a credit counselor, and after it to pass mandatory paid courses on personal financial management.

3. Results and Discussion

The key problem of modern Russian society on the issue of quality of life — the lack of social and psychological attitude of people to acquire and maintain a constant high level of professional and general cultural education, without which it is impossible to build a knowledge economy.

The use of Western models for the Russian economy is difficult, therefore, domestic economists developed their own models of risk prediction of bankruptcy or adapt Western models. Among domestic diagnostic model of risk of bankruptcy of enterprises can distinguish models developed by RS Saifulin and GG Kadykova (1996) and AD Belikov and GV Davydova scientists of the Irkutsk State Academy of Economics (1997).

The model of the Irkutsk State Academy of Economics is four-factor model. Based on the regression equation calculates the integral index R risk of bankruptcy. Depending on its value concludes that the probability of bankruptcy.

We believe that the introduction of the Russian legal field of such a procedure — a conversation with a credit counselor — will enhance legal literacy and legal culture of Russian society as a whole that is an essential prerequisite for the efficiency of market mechanisms, including insolvency Institute (bankruptcy) of the citizen.

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Econometrics

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Balashova R. The Development of financial and economic efficiency of the enterprise on the basis of economic-mathematical modeling

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Abstract: The article considers the possibility of applying economic-mathematical models constructed on the basis of economic analysis of the evidence and a methodological orientation to predict expected performance. It is shown that for the planning of labor productivity, the best relationship is linear model, followed by the logarithmic function, hyperbola and hyperbola with offset. It is concluded that the use of economic-mathematical models is relevant and provides the optimal actions necessary for economic development.

Keywords: development, enterprise, efficiency, mathematical modeling, Finance, Economics.

1. Introduction. In the activity of enterprises in modern conditions of economic development the method of economic-mathematical modeling is used to evaluate and predict economic and financial results.

As a result of development of information technologies there is the opportunity to conduct a largely systematic process of modeling, which includes the creation of a model, interpretation of simulation results the statistical evaluation. The application software facilitates the construction of models that account for a significant number of internal and external factors of the enterprise.

Economic-mathematical model of activity and development of an enterprise is a reflection of her as a set of logical relations, equations, and graphs. The advantage of using such models lies in the possibility of obtaining with their help, we confirm the calculations of the insights about the General features of the future sustainable development of the enterprise.

Development of economic-mathematical model for the enterprise will allow to define the sequence of possible state – trajectories of development that cannot be considered as strictly determinirovannyi, tightly regulating its activity. They describe only the scenarios of its development, asking fundamentally possible way, the overall Outlook of activities of enterprises subordinated to the achievement of strategic objectives. Therefore, when forming long-term plans for the company needs to develop several options.

For economic and mathematical modeling of enterprise can be applied the method of dynamic simulation, including techniques of formalization of the management of financial-economic activity of the enterprise. This method allows to structure the formation of enterprise development, to describe and predict the process of sustainable development, covering a large number of variables.

2.Materials and methods. Theoretical and methodological basis of the study of economic theory, the writings of scholars. The information base consists of legislative acts concerning the activities of enterprises, statistical materials of the State statistics service. The study used General scientific methods, methods of abstraction and complexity, methods of comparison and generalization, the method of mathematical modeling.

The results of formalizing the development of the enterprise is envisaged to be meaningful and comprehensive, but at the same time as simple as possible. A large number of characteristics in the formalization of enterprise development selects only those that are based on theoretical assumptions considered to be the primary and correspond to the task of modeling. A key role in the description of sustainable development of the company during its formalization is the choice of initial reserves, the nature, the methods applied and the scope of services in a predictable period of time based on the results of assessment of company potential.

The use of economic-mathematical models constructed on the basis of economic analysis of the evidence and a methodological orientation to predict expected performance is completely justified. In the course of creation ekonomiko-mathematical model and simulation algorithm a number of features inherent in the phenomenon are not taken into account fully, a

number of parameters are inaccurate, sometimes it is unknown or uncertain values using average empirical values, etc. This eliminates the possibility of constructing a mathematical model that would correspond to reality, and there is a need to adopt and explore not one, but multiple models that reflect different possible changes in the forecast data.

However, the selected characteristics must be measured. Various options for the development of the enterprise should be reflected in the calculation of a certain set of economic indicators that would allow quantitative and qualitative evaluation of alternatives (measures) of development. To determine the impact of enterprise development on the results of financial and economic activities necessary to build optimization models linear programming.

The use of mathematical modeling would be useful for future planning and forecasting indicators for the accumulation of resources of the enterprises so that the generated economic potential provided its sustainable development.

The relevance of the application of methods of economic-mathematical modeling on the basis of statistical analysis, confirm that to evaluate current performance and predict future currently used mainly methods of economic analysis. Thus, the development of modeling methods and statistical data processing in the practice of analysis corresponds to the modern requirements.

Problems of application of such modeling and analysis have been investigated by scientists and are reflected in the literature.

Says E. Pitman, one of the important tasks when creating a model is its identification, verification of its adequacy, the choice of its best forms. The identification problem consists in determining the parameters of the model on the basis of experimental data obtained in the result of observation of the studied phenomenon. For this purpose, data about the object of study, resulting in forming hypotheses about the model [1, p. 28].

As pointed out by M. Kubanin, the same trend can be expressed in several types of models, and each requires the definition of parameters. In practice this is usually done using least

squares methods and maximum likelihood. Identification involved determining the fit of the model to experimental data, cannot always be made, and therefore empirical estimates [2, p. 12].

n the works of A. A. Gorchakov, A. A., Castle notes that the choice of the final model is the most important stage of the modelling process, where the problem of finding the optimal parameters between model complexity, completeness characteristics, and their accuracy [3, p. 73]. The most consistent can be considered as a systematic approach to a specified array, on the basis of which the principle of combination of the simplicity of the model and its adequacy. This principle requires a comparison of the results of the calculations to errors caused by various reasons and random nature of the results of the study, the incomplete correspondence of the model and of the object, the inaccuracy of the original data.

The works of A. I. Kharlamov, R. A. Shmoilova, A. P. Kulicheva indicated that the advantage of a particular model should be evaluated on the basis of statistical criteria taking into account the assessments of adequacy [4, p. 89; 5, p. 67].

The study of methods of economic-mathematical modeling and statistical analysis and the rationale for their use of activities of enterprises, the definition and method of determining the final form of the mathematical model of the efficiency factors is relevant to businesses of all types and forms of ownership.

The study of literary sources we can conclude that the sentences the selection procedure the final form of the economic-mathematical model of efficiency of activity of the enterprise is necessary to take into account the specifics of its activities. To solve the set task it is advisable to consider a number of statistical indicators. Checking adequacy of the model for calculating the economic enterprise development can be carried out on the basis of a number of statistical characteristics. Most of them are based on comparing the initial actual data and the theoretical values determined using the regression equation. Despite the fact that each of the characteristics it evaluates the same as a model of efficiency, the findings based on each of the equations do not always coincide, which implies the need to calculate the various estimates. Since, as a rule, uses

several types of models, the analysis of those that are determined by the statistics (coefficients) becomes one of the most important tasks [6, p.12].

In the reviewed publications on economic modeling, the statistical characteristics are considered separately, attention is paid only to the parameters characterizing a specific model. If conclusions about the adequacy and reliability of models that characterize the performance of the enterprises, are the same, the problem is solved. But more often than not, and this part of the research model is particularly important for the economic practice of enterprises.

On the basis of the findings in the study of materials and economic activities of the nine campaigns (LLC "Stateb plus", LLC "Ilitash-opt", LLC "Darya-Avto", LLC "Fortuna", LLC "Guasar", LLC "Zet-prom" LLC "Crown", OOO "Lyuks-TRANS, OOO Dolomite plant", LLC "Ircomplex") used the method of economic-mathematical modeling:

1. Defined indicators ( ) that affect economic development t enterprise: productivity, the average cost of travel services, turnover, net income, cost of 1 RUB. of the gross income.

Table 1

These statistical coefficients according to the types of economic and mathematical models and economic indicators

Economic indicators (factors)	Types of models (regression nye equation)	Coefficient correlation R	Average linear deviation	The mean and standard deviation	Coefficient Fisher's F
Produce tions labor	$y = a + bx$	0,501	5,04	5,48	10,295
	$y = a + \frac{b}{x}$	0,393	4,86	5,57	10,061
	$y = a + bx + \frac{c}{x}$	0,550	5,08	5,85	10,200
	$y = a + b \times \ln x$	0,481	4,95	5,50	10,237
The average cost of services	$y = a + bx$	0,812	4,35	4,80	12,49
	$y = a + \frac{b}{x}$	0,411	5,56	4,96	10,08
	$y = a + bx + \frac{c}{x}$	0,923	5,15	4,73	11,90
	$y = a + b \times \ln x$	0,633	5,01	5,27	10,87
Turnover	$y = a + bx$	0,744	4,55	5,01	11,72

resources	$y = a + \frac{b}{x}$	0,474	4,75	5,51	10,218
	$y = a + bx + \frac{c}{x}$	0,758	4,24	5,37	10,796
	$y = a + b \times \ln x$	0,689	5,06	5,15	11,245
Gross income	$y = a + bx$	0,811	3,94	4,81	12,47
	$y = a + \frac{b}{x}$	0,848	3,79	4,68	13,01
	$y = a + bx + \frac{c}{x}$	0,860	3,69	5,00	11,37
	$y = a + b \times \ln x$	0,884	3,66	4,50	13,61
Costs per 1 ruble of gross income	$y = a + bx$	0,695	4,25	5,14	11,3
	$y = a + \frac{b}{x}$	0,810	4,10	4,81	12,46
	$y = a + bx + \frac{c}{x}$	0,964	3,93	4,61	12,15
	$y = a + b \times \ln x$	0,753	4,18	4,98	11,81

2. The calculation data of the effectiveness of these measurements used a single-factor model four types:

– linear relationship $y = a + bx$; (1)

– inverse relationship $y = a + \frac{b}{x}$; (2)

– hyperbole with an offset containing a linear and inverse component

$y = a + bx + \frac{c}{x}$; (3)

– logarithmic function $y = a + b \times \ln x$; (4)

where y – the efficiency coefficient, characterizing the activity of enterprises;

X_i^n – indicators of activity of the enterprises used in the calculation : $i = 1,\ n = 5.$

a, b, c – the parameters defined by the method of least squares for each of these models describing the dependence of the efficiency from changes in economic indicators of enterprises.

3. The analysis of the obtained statistical indicators using the correlation coefficient R, the average linear deviation, standard deviation, coefficient Fisher's F.

From table 1 it follows that the correlation coefficient R, limit values which are within the range of ($-1 \prec R \prec 1$,), reflects the relationship of each factor, economic indicator, economic growth. This figure indicates a significant correlation between economic development and the amount of income and the cost of 1 rub. of the gross income (value R approaching 1), slightly lower with turnover R = 0,474-058 and quite weak, with labor productivity R = 0,393-0,550.

Together with this General conclusion we may mention the differences in regression functions. If you analyze the volume of income deviation, maximum and minimum values of the correlation coefficient R for various functions irrelevant (they do not exceed 0,07), for the cost of 1 rub. gross income the range of changes is from 0,7 to 0,95; for turnover of resources – from 0,47 to 0,76; the average cost of services from 0,41 to 0,92; for productivity – from 0,39 to 0,55. The use of these values allows to prefer one model or another, and also to organize models for the proximity of values to the real and to choose the optimal regression model.

A study of the average linear deviation defines the relative discrepancy between the actual and theoretical values of economic development activity. This ratio shows that the preference can be given to models with the lowest percentage of variance. For factor productivity average linear deviation changes from 4,86% (hyperbole) to 5,08% (hyperbole offset); average cost of services – from 4,35% (linear function) to 5,56% (hyperbole); the turnover of services – from 4,24 to 5,06% for gross income from the 3,66 to 3,94; for the cost of 1 rub of income from 3,93% to 425%.

The data (table 2) indicate a considerable variation when considering the statistical parameter – standard deviation. It is known that, the smaller the value of this index, the more meaningful the equation. Thus, a linear function of assessment is best for productivity (5,48) and turnover resources (5,01), hyperbole shift (4,73) – average cost of services. The reliability of

economic-mathematical model is determined by using the Fisher criterion: the reliability of the model increases with the increase of this indicator.

Table 2

Analysis of the indices of the coefficients according to their importance

Economic indicators (factors)	The numbers of the equations	Type model	Evaluation (points)				The sum of the scores $\sum_{i=1}^{n=4} P_i$
			Coefficient correlation R	Average linear deviation	The mean and standard deviation	Coefficient Fisher's F	
			P_1	P_2	P_3	P_4	
Produce tions labor	1	1	2	3	1	1	7
	2	2	4	1	3	4	12
	3	3	1	4	4	3	12
	4	4	3	2	2	2	9
The average cost of services	5	1	2	1	2	1	6
	6	2	4	4	3	4	15
	7	3	1	3	1	2	7
	8	4	3	2	4	3	12
Turnover resources	9	1	2	2	1	1	6
	10	2	4	3	4	4	15
	11	3	1	1	3	3	8
	12	4	3	4	2	2	11
Gross income	13	1	4	4	3	3	14
	14	2	3	3	2	2	10
	15	3	2	2	4	4	12
	16	4	1	1	1	1	4
Costs per 1 ruble of gross income	17	1	4	4	4	4	16
	18	2	2	2	2	1	7
	19	3	1	1	1	2	5
	20	4	3	3	3	3	12

All the values of the Fisher criterion exceeds the critical value, so the reliability of all these models is confirmed. Based on this characteristics you can analyze the data of economic-mathematical models and pick the best.

A comparison of the conclusions of models based on different performance indicators highlighted the divergence in the selected types of models.

4. The choice of an optimal model of efficiency of activity of enterprises on the basis of ranking obtained data of statistical indicators according to their importance. According to her determined for each model, the place it occupies on the basis of selected criteria. It will more specifically represent the importance of economic dependency for each indicator and to formulate the principle of determining the value of the model.

5. The formulation of the principle advantages of the model: characteristics of economic indicators and the estimated coefficients suggests that the optimal model with the fewest total points.

3. Results and Discussion: planning of labor productivity, the best relationship is linear model, followed by the logarithmic function, hyperbola and hyperbola with offset. For the remaining indicators are also calculated the sum of the ranks for all the indicators appraising a preference to models with smaller amounts. If the least a few amounts in favor of the more simple dependence. Thus, the linear model is the best for productivity, the average value of travel services and the turnover of services accurately reflects the logarithmic change in gross income, and hyperbola offset gives the most optimal characterization of the impact of the cost of 1 RUB gross income.

In modern conditions the use of economic-mathematical models is relevant and provides the optimal actions necessary for economic development.

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