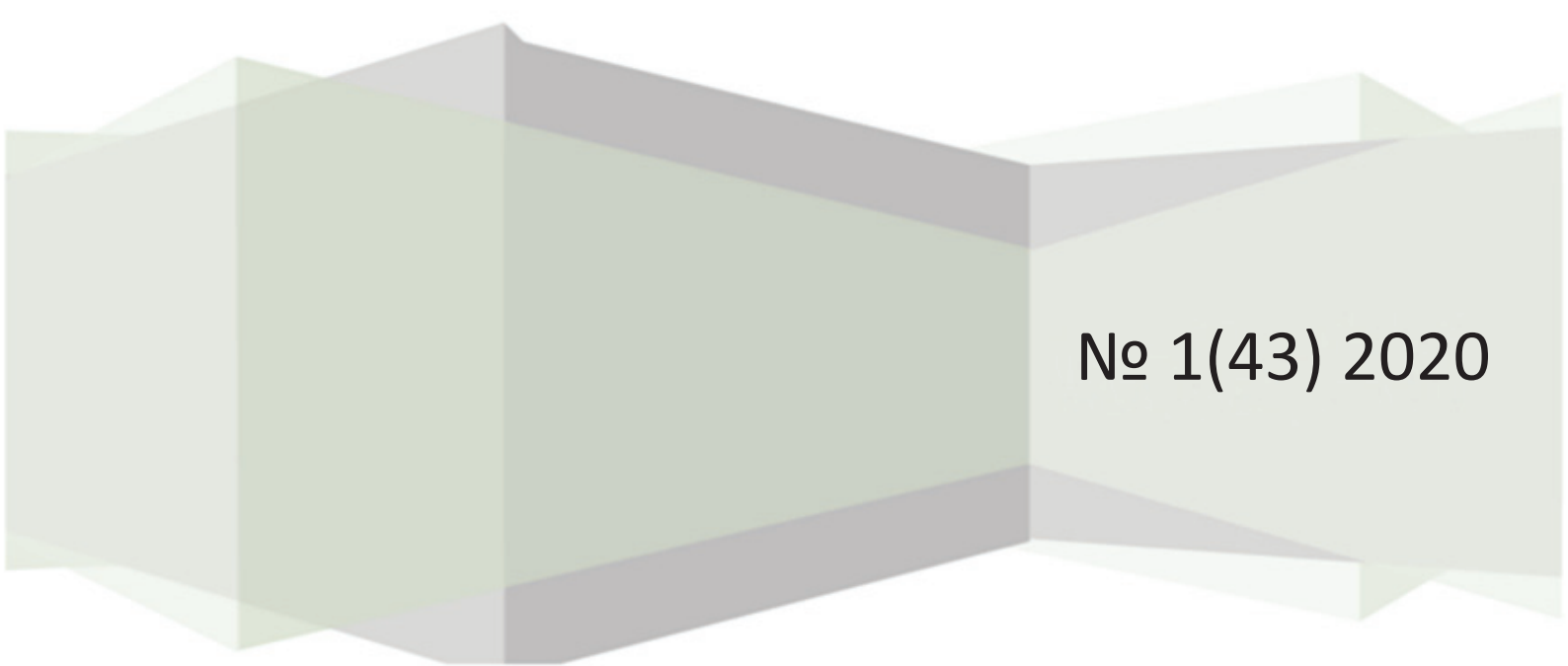


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## Innovative Solutions in the Field of Development Strategies for Mining Industries for Cement Manufacturing

E.V. Zaytseva

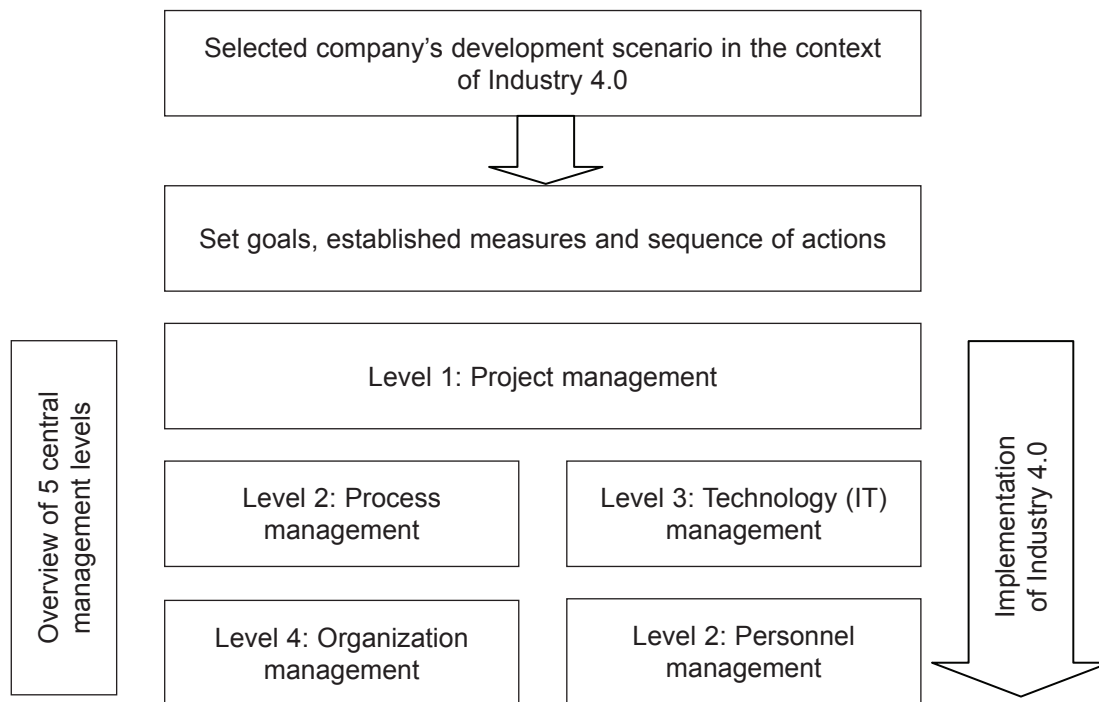
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**Key words and phrases:** growth strategy; Industry 4.0; innovative technologies; cement industry; digital factory.

**Abstract:** The paper aims to develop approaches for the implementation of the Industry 4.0 concept as one of the components of an innovative strategy for the development of cement manufacturing. The objectives of the study are to identify central management levels for the full implementation of this concept and develop a methodological approach to implementing measures to introduce elements of the digital economy. It is assumed that despite a significant amount of domestic and foreign studies on the issues of choosing and substantiating the strategy of innovative development of enterprises, there is no unified approach to solving this problem. The methods of the theory of utility, game theory, qualimetry and the method of expert survey were used in the study. The findings of the study are the most important stages and elements necessary for a comprehensive and long-term implementation of the concept of Industry 4.0, which is a key component of increasing the technical and economic efficiency of production and increasing the competitiveness of products.

### Introduction

Digital plant has become a modern term in the field of strategic development of a cement enterprise. The procedure for a strategy development of Industry 4.0 concept generally includes three stages: analyzing the actual situation of the company from the perspective of Industry 4.0 (strategic level), goal setting (tactical level) and designing measures to implement the concept (operational level). The third stage is crucial in implementing Industry 4.0. Hence, a lot of companies undoubtedly discovers areas in the business that can be optimized and outline strategic paths for their development, but the strategic goals are unachieved. This occurs due to the fact that there are difficulties in choosing such a project from the abstract formulated, which will be most effective. Full implementation of these goals is associated with an adoption of appropriate measures at different levels of management (Fig. 1), which is a rather ambitious task [1].



**Fig. 1.** Management levels required for full implementation of an Industry 4.0

The purpose of the study is to develop approaches to the implementation of innovative projects based on the use of such elements of the digital economy as predictive repairs, predictive product quality and machine vision in production for the mining industry of the cement industry; to introduce these developments in order to transfer the above enterprises to a new technological structure.

### The relevance of the research

The processes of globalization of the world economy, increased competition in the domestic and foreign markets determine the strategic directions for the development of mining industries, which should now be strictly linked to the use of digital technologies and elements of the digital economy. At the same time, sustainable development is a prerequisite for maintaining their proper competitiveness, which implies the constant development of production capacity with an acceptable level of profitability, a continuous increase in technical and economic efficiency and ensuring production safety at risk.

### Results and discussion

Project management is the first level. The remaining levels are subordinate to the first level, since it combines all the established and undertaken measures in the field of processes, IT technologies, organizations and personnel. In this case, the project refers to the temporary joint work of the company's specialists, representing a team aimed at achieving common goals [7]. Moreover, the team should be cross-functional, that is, it should consist of key experts from different functional areas. The presence of such a team is crucial when implementing Industry 4.0, since it provides:

**Table 1.** The main formation stages of a digital cement enterprise

Main stages	Key results
1. Organization of automated (with human participation) control and management of technological processes of production (ACS TP)	Control of the main processes
2. Organization of on-line monitoring and dispatching of all (critical) production facilities (equipment, workplaces, service departments, etc.)	Real-time production management through standard workflows
3. Creation of a single digital information space of an enterprise for all production processes complex automation of all end-to-end chains of business processes (integration of all systems, data storage with different levels of detail and discreteness, the use of predictive analytics, operational production management, etc.)	Supply Chain Management
4. Introduction of new management models based on support for process life cycles	Service management as an integral part of production

- organization and intersectoral coordination of the problem statement taking into account the management of processes, information technology, organization and personnel;
- formulation of the problem and definition of its boundaries;
- scheduling time frame solution to a problem;
- control over the solution of the problem and the degree of achievement of the goals;
- technical risk assessment;
- assessment of the results in terms of cost-benefit ratio.

At the second level, the process management is associated with the analysis of business processes, which will allow understanding processes required for the optimization in the enterprise. As for the cement industry enterprises, the application of such a concept should cover the entire production chain of the enterprise: mining, processing, production, sale and shipment. Without an integrated approach to production, enterprises may miss the opportunity to increase efficiency, productivity, profitability and quick adaptation to the market. The aim of this level is to optimize equipment operating modes, optimize equipment loading, logistic optimization, increase productivity and labor safety, improve demand forecasting, improve product quality and reduce the time to market for products. At this stage, the previously formed cross-functional team jointly identifies and prioritises areas of activity in which it is advisable and most beneficial to carry out digital transformations aimed not only at improving IT, but also at technological and organisational development. Process management plays an important role in the implementation of Industry 4.0, as it is the basis for the implementation of the strategy of the concept and provides a clear understanding of the goals, weaknesses and relationships for all participants.

The third level is associated with selecting, planning and implementing appropriate technologies of Industry 4.0 in order to create the digital double. This transformation is carried out through the use of cyber-physical production systems, which is characterized by a horizontal combination of various information systems and a vertical combination of production systems at all levels of automation that go beyond the boundaries of the enterprise [5]. It is important here to choose from various options those innovative technologies that are optimal for a particular enterprise and type of production. Therefore, for the cement industry [8] table 1.

At the moment, some of these tasks are already being successfully solved by transforming processes, modernizing and introducing new software products that support them. The IT



Table 2. Implemented IT projects in cement holding

Directions and projects	Results and issues
<b>1. Information structure</b>	<b>Results</b>
<ul style="list-style-type: none"> <li>– Creation of a new Unified Technical Data Center (DPC) of the Holding Company.</li> <li>– IP Telephony Implementation.</li> <li>– Launching a video conferencing system.</li> <li>– Launch of backup communication channels.</li> <li>– Implementation of information security systems</li> </ul>	<ul style="list-style-type: none"> <li>– All major corporate infrastructure facilities are integrated into a single corporate network.</li> <li>– Corporate communications solutions are actively used.</li> </ul> <p style="text-align: center;">Current issue:</p> <p>Digital production infrastructure (measuring instruments, sensors, etc.) is poorly covered</p>
<b>2. Production complex</b>	<b>Results and issues</b>
<ul style="list-style-type: none"> <li>– Introduction of automated process control systems (ACS TP) into production.</li> <li>– Implementation of an electronic document management system with Russian Railways "ETRAN".</li> <li>– Implementation of a system for monitoring fuel consumption in open pit mining vehicles.</li> <li>– Implementation of an automatic control system for the shipment of finished products for cars and railway vehicles (cargo yards) at factories.</li> <li>– Online video monitoring of the main production stages.</li> <li>– Integration of MES and process control systems at the factory of the Holding company.</li> <li>– Development of screens for an online monitoring of MINISCADA production</li> </ul>	<ul style="list-style-type: none"> <li>– Implemented the ability to track and adjust the current state of production equipment online.</li> <li>– Management of the process occurs at the level of individual control of the process.</li> </ul> <p style="text-align: center;">Current issues:</p> <p>There is no possibility of a return of the control action to production as a whole</p>
Directions and projects	Results and issues
<b>3. Corporate Information Systems (CIS)</b>	<b>Results</b>
<ul style="list-style-type: none"> <li>– Implementation of the Unified Corporate Accounting System based on AS "Parus".</li> <li>– Implementation of a budgeting system.</li> <li>– Implementation of the consolidated financial reporting system in accordance with IFRS.</li> <li>– Implementation of a corporate electronic document management system.</li> <li>– Implementation of a capital construction project management system.</li> <li>– Implementation of a corporate internet portal and distance learning system.</li> <li>– Implementation of a system of legally significant electronic document management</li> </ul>	<ul style="list-style-type: none"> <li>– A single information system architecture for all enterprises has been implemented that provides for the accounting of transactional data.</li> <li>– Introduced planning of individual processes.</li> </ul> <p style="text-align: center;">Current issues:</p> <p>The majority of implemented projects were aimed at building a data accounting system, the focus of automation is the functions of departments, and not end-to-end chains of business processes</p>
<b>Corporate Reporting Systems (BI)</b>	<b>Results</b>
Implementation of management reporting system BI	<p>Implemented the functionality of collecting and generating corporate reporting for the management of the Company.</p> <p style="text-align: center;">Current issues:</p> <p>The BI functionality does not have the ability to build a variety of analytical reports, the current reporting is static</p>



**Table 3.** Potential IT development steps for three years

Development directions	Target results
<p><b>1. Computerisation and networking</b></p> <ul style="list-style-type: none"> <li>– Duplication of the system for automated control of the shipment of finished products of cars and railway vehicles to all plants of the Holding Company.</li> <li>– Mobilization of bypasses and repairs of production equipment.</li> <li>– Implementation of an operational production management system at the Plant-Workshop-Equipment levels</li> </ul>	<ul style="list-style-type: none"> <li>– Providing operational data directly from sensors, devices, etc.</li> <li>– Organization of continuous monitoring of the state of production</li> </ul>
<p><b>2. Data Warehouse</b></p> <ul style="list-style-type: none"> <li>– Creation of a repository of technological (industrial) data.</li> <li>– Implementation of a corporate knowledge base (library of technical and other documentation).</li> <li>– Digitization of a quarry: collection of geological, technological and statistical data.</li> <li>– Introduction of paperless workflow between internal and external companies.</li> <li>– Introduction of an electronic archive of all legally relevant documents</li> </ul>	
Development directions	Target results
<p><b>3. Data processing and process integration.</b></p> <ul style="list-style-type: none"> <li>– Implementation of regulatory reference Information (inventory materials, asset classifiers).</li> <li>– Transformation of production asset management processes.</li> <li>– Automation of production management processes.</li> <li>– Implementation of “smart” energy consumption (optimization of planning and metering processes for energy consumption).</li> <li>– Implementation of the end-to-end chain “from need to write-off” (material technical support automation).</li> <li>– Creation of a digital partnership ecosystem (providing digital interaction with partners throughout the supply chain)</li> </ul>	<ul style="list-style-type: none"> <li>– Coverage of the basic management processes of a manufacturing enterprise with IT tools.</li> <li>– Providing full-featured production management based on data received from equipment.</li> <li>– Optimization and automation of end-to-end chains of business processes.</li> <li>– Providing decision-making based on true data (primary source)</li> </ul>
<p><b>4. Digital control models</b></p> <ul style="list-style-type: none"> <li>– Introduction of production optimization processes based on an integrated model.</li> <li>– Implementation of operational forecasting of sales.</li> <li>– Introduction of integrated supply chain planning</li> </ul>	
	<ul style="list-style-type: none"> <li>– Digitization of the value chain and the degree of influence of decisions made on the effectiveness of the Holding Company as a whole.</li> <li>– Ability to plan and model processes in the form of interconnected and influencing each other process chains.</li> <li>– Selection of optimal options for the implementation of strategic plans and their justification</li> </ul>

projects implemented at one of the cement companies are presented in table 2.

The table shows that innovation also affected the information structure, production complex, corporate information systems and corporate reporting systems. And potential steps in the field

of increasing the introduction of IT technologies are presented in table 3.

For the further implementation of digital solutions, it is important that the tasks of the cross-functional team are to compile a detailed list of necessary transformations in each direction, expertly determine the timing of the implementation of changes and the necessary resources.

The fourth level is about changing the hierarchical structure of the enterprise in connection with the introduction of Industry 4.0. The organizational structure of the enterprise consists of several divisions, with each responsible for its own area of activity, for example, marketing, development, production and sale. Such a structure is characterized by a deep hierarchy and a large role of social status for a person.

There is no doubt that with the introduction of Industry 4.0, it is necessary to rethink the organizational structure of the enterprise. A new structure appears here – horizontal organisation, a flat hierarchy, as well as a focus on consumers and business processes [3]. The advantages of such an organisation are optimization of communication methods, flexible consideration of aspects important for competitiveness, and joint problem solving.

The fifth level is about an optimal personnel management in the context of implementing Industry 4.0. Productivity and success of a company is largely determined by the performance of its employees, therefore, measures aimed at improving the performance and development of staff creativity are of great importance [4].

Increased manufacturing flexibility brings about changes in management personnel, in particular, changes relate to:

- functions and duties (changing the list of duties);
- competency requirements for employees (the importance of mental work has grown significantly and is paid at higher rates. This phenomenon is called the “shift of technological progress towards those who know how to work with new technologies);
- privacy policy, which is associated with the free exchange of information between information systems;
- work schedule due to changes in the production process.

It is obvious that with the advent of Industry 4.0, changes occur that violate the usual, established processes and forms of organization. These changes cause distrust among employees, and partly demotivate them. To avoid this, you can use a special change management scheme, which will effectively solve the above difficulties.

### **Conclusions**

One of the important elements of digitalization should be a unified personnel database. That is, to create a single, end-to-end “smart” database that gives the maximum idea of what a person has already been doing, what he knows how, on what projects he has achieved the best results. This will allow the formation of cross-functional and cross-site groups in non-standard career planning. And in the end, a “digital portrait” of all employees will be developed to make informed long-term career decisions.

Thus, a structured implementation of Industry 4.0 at cement enterprises is possible subject to strategic, tactical and operational aspects. And for the full implementation of a digital enterprise, it is necessary to create special management levels, such as: project, process, IT technology, organisation and personnel management. Enterprises that change the approach to production and implement the principles of Industry 4.0 will significantly save material resources and increase the efficiency of cement production. At the same time, digital transformation allows

us to adjust the company's strategies in accordance with new realities and expand the range of products and services.

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### Подход и реализация инновационных решений в области стратегий развития горноперерабатывающих производств цементной отрасли

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**Ключевые слова и фразы:** стратегия роста; Индустрия 4.0; инновационные технологии; цементная промышленность; цифровой завод.

**Аннотация:** Цель исследования состоит в разработке подходов и реализации концепции Индустрии 4.0 как одной из составляющих инновационной стратегии развития цементных производств. В задачи исследования входит выявление центральных уровней управления для полноценного внедрения данной концепции, а также разработка подхода к реализации мер по внедрению элементов цифровой экономики. Несмотря на значительный объем отечественных и зарубежных исследований, касающихся в той или иной мере вопросов выбора и обоснования стратегии инновационного развития предприятий, целостной концепции решения этой проблемы нет. В работе использовались методы теории

полезности, теории игр, квалиметрии и метод экспертного опроса. В статье представлены важнейшие этапы и элементы, необходимые для комплексного и долгосрочного внедрения концепции Индустрии 4.0 как ключевой составляющей повышения технико-экономической эффективности производства и повышения конкурентоспособности выпускаемой продукции.

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## Research on Measuring the Level and Quality of Life

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**Key words and phrases:** economic and social indicators of living standards; quality of life; economic indicators; indicators of life satisfaction.

**Abstract:** In order to study the indicators of the level and quality of life of the population, the main indicators and coefficients are analyzed. The methods of statistical and economic analysis presented the relationship between economic and social indicators of living standards, presented quantitative and qualitative methods of assessment, identified the existing relationships between them. Often, high level economic indicators do not determine high levels of life satisfaction.

Improving the standard of living of the population remains the most important task of the state, because the problem of assessing the standard of living of the population is relevant for any government. It is necessary to find out the correlation between economic and social indicators of living standards, and what dependencies exist between them. It is known that high economic indicators do not always mean high levels of life satisfaction. The study of indicators of the population's standards of living is one of the most important problems of the economy.

International statistics on measuring the standards of living of the population have been developed relatively recently. Since 1960, some of the indicators of living standards have been proposed. One of the most popular versions of the system of indicators of living standards in the UN international statistics was created in 1978. The system includes 12 main indicators of living standards. Of course, every country in the world uses its own system of indicators to measure and assess the standard of living of the population.

The main indicator, personal income, depends on the state system, economic situation, traditions, climate, level of economic development, forms of ownership. Since in many countries the minimum wage and social benefits of the state depend on the amount of the subsistence minimum (according to Article 26, Part 2 of the Declaration of Human and Civil Rights and Freedoms), the relationship between the population's income and the subsistence minimum is usually studied. This relationship allows measuring the level of poverty in the country.

The social orientation of the economy of all countries is gradually increasing, since now the human factor has a significant impact on the competitiveness of countries in the world economy. Increasing spending on improving health and education is particularly important.

Almost all economic reforms are aimed at improving the level and quality of life. Today it has become obvious that improving the standard of living of the population is not only the result

of economic growth, but also its condition. Modern production technologies need both new technical achievements and qualified personnel of the appropriate level.

All indicators for assessing the level and quality of life are divided into quantitative and qualitative.

The most obvious are quantitative indicators of the level and quality of life:

- GNP or national income per capita;
- the level of income and its distribution in society;
- the level of consumption of various material goods and services by class of goods;
- employment rate, etc.

In turn, qualitative indicators of the standard of living include assessment of life satisfaction, working conditions, everyday life and leisure of a person.

Most often, two approaches are used to assess the level and quality of life:

1) the system of social indicators: each country has its own national system, which is based on the methodological recommendations of the UN and the OECD;

2) a composite index of the level and quality of life based on individual performance: this approach is most often used by the UN and other international organizations to conduct cross-country comparisons of the level and quality of life of the population of different countries.

The calculation of indicators of the level and quality of life of the population usually begins with the analysis of indicators of total income and its derivatives.

As indicators of income used to calculate the level and quality of life, the indicators of distribution of families by the amount of income per family, by income per family member, by net income are used. The indicators of average wages, pensions, scholarships, and allowances are analyzed.

The total income usually includes all types of monetary income of the family, the cost of natural products from the personal household, as well as the cost of transfers from the state. As a rule, they calculate:

- total income (gross income), i.e. family income before taxes and other mandatory payments;
- disposable income (net income) that remains available after taxes and other mandatory payments are paid.

Such an important source of income as a salary is usually considered in two ways:

1) the gross salary that an employee receives before taxes and other mandatory payments are deducted;

2) the net salary is calculated after deducting taxes and other mandatory payments.

It is accepted to express the subsistence minimum by two indicators – the vital (physiological) minimum and social subsistence minimum.

If the physiological cost of living includes products necessary to meet the physiological needs of a person, to maintain a stable physical ability to live and work.

The social cost of living contains not only a minimum for maintaining the physiological standard of living, but also includes expenses for satisfying the minimum social and spiritual needs of a person.

Complex advanced characteristics of the level and quality of life of the population give the coefficients of income inequality, showing the amount of excess cash high net income groups compared to low income groups. The following differentiation coefficients are used in international practice:

- fund ratio coefficient shows the ratio between the average income values within the

compared population groups or their shares in total income;

- decile coefficient shows differences in the income level of 10 % of the most affluent and 10 % of the least affluent groups of the population;
- quartile (quintile) coefficient shows differences in the income level of 20 % of the most affluent and 20 % of the least affluent groups of the population;
- stratification coefficient shows the ratio of the number of poor to the number of rich.

A comprehensive assessment of changes in the standard of living is made using the cost of living index (consumer price index-CPI) (coli).

The cost of living index is calculated in several stages. At the first stage, family budgets are analyzed in order to collect data on the structure of expenditures of various groups of the population. At the second stage, stores are selected where changes in prices for representative products are studied. At the third stage, a set of representative products is determined, which varies in different countries from 100–200 to 1,000 types. The “weights” system is used to ensure the transition from specific representative products to aggregated product items.

The calculation of the system of indicators of the level and quality of life of the population is the basis for solving the most important tasks of the economy.

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### Анализ механизмов определения уровня и качества жизни

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**Ключевые слова и фразы:** качество жизни; показатели удовлетворенности жизнью; экономические и социальные показатели уровня жизни; экономические показатели.

**Аннотация:** Проведен анализ основных показателей и коэффициентов уровня и качества жизни населения. Методами статистического и экономического анализа выявлены взаимосвязи между экономическими и социальными показателями уровня жизни, рассмотрены количественные и качественные методы оценки, определены существующие меж-



ду ними зависимости. Установлено отсутствие четкой зависимости между высокими экономическими показателями уровня жизни и высокими показателями удовлетворенности жизнью.

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## Fundamentals of Studying the Dynamics of Market Prices and Demand

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**Key words and phrases:** policy of an open market economy; study of the dynamics of world prices; economic activity; price level; demand; supply; elasticity of demand; elasticity of supply.

**Abstract:** In the countries with an open market economy, the analysis of world prices is of global importance for the efficiency of economic activities of producers of goods, intermediaries and buyers. In order to study the influence of prices on the level of supply and demand, the efficiency or loss of the economy, an analysis of the main factors that determine the price level is made. Economic analysis has shown that they change under the influence of market conditions (the ratio of supply and demand). The mechanisms of influence of price dynamics on the economic situation of sellers, buyers and their market interests are shown.

Most of the world's countries have opted for an open economy. In those countries that have an open market economy, the study of the dynamics of world prices is of great importance for the correct orientation in the economic activities of producers of goods, intermediaries and buyers.

The impact of price changes on the world market largely determines the level of domestic prices in a particular country. To an even greater extent, the price level determines the effectiveness or unprofitability of a country's foreign trade.

A common property of prices is that they change under the influence of market conditions (the ratio of supply and demand). Therefore, price dynamics have a decisive influence on the economic situation of sellers and buyers and determine their market interests. Analysis of supply and demand dynamics is of key importance.

Demand is a paying need, that is, the amount of money that customers can and intend to pay for some of the products and services they need. Demand is influenced by a number of market factors, such as customer income, quantity, season, advertising, and consumer tastes and preferences.

The law of demand expresses the following functional (mathematical) dependence of demand ( $C$ ) on price ( $C$ ) and it can be represented as a formula:

$$C = F(C),$$

where  $F$  is the indicator of quantitative dependence. The higher the product price, the lower the

demand for the product from buyers.

For example, when prices for subscription publications increased in Russia in 1991–1998, this led to a reduction in the volume of subscriptions. The market also has an inverse relationship, which is that the lower the price of a product, the higher the demand for it.

The amount of quantitative change in consumer demand in response to price movements is characterized by the elasticity (or rigidity) of demand. Demand elasticity shows the dependence of the degree of change in demand (its “sensitivity”) depending on the price change. Elasticity is usually measured in coefficients.

Elastic demand is formed when there is a change in the value of demand by a greater percentage than the price changes. The value of the elasticity of demand for the price is always a negative number, because the numerator and denominator of the fraction are always opposite and have different signs.

For example, in the United States, the market research has produced the following stable dependencies of demand elasticity on price (for a long-term period, with a “minus” sign):

- office supplies –0.6;
- gasoline –1.5;
- housing –1.9;
- cinema –3.9.

Inelastic or rigid demand is formed in conditions when the effective demand of buyers is not sensitive to changes in prices. This is usually associated with essential goods. For example, no matter how the price of salt or the Internet increases or decreases, the demand for them remains unchanged.

The study of the dynamics of market prices and the coefficient of elasticity of demand is crucial for predicting the volume of demand of the population when the level of market prices changes. Since the offer is a set of goods and services that sellers are willing to sell on the market at different levels of market prices. For example, the local market sells apples, and as the price increases, the number of apples offered for sale will increase.

The dependence of changes in sales volume in response to price increases shows the elasticity of supply. The elasticity of the offer characterizes the degree of its change depending on the dynamics of the price. Therefore, the offer may be elastic or inelastic depending on the price. Elasticity analysis is of great importance for product manufacturers who predict the degree of elasticity of sales of new products and services in advance.

The proposal is considered to be elastic if its value changes by a larger percentage than the change in price.

The market experience of Western countries shows that the coefficient of elasticity of supply – if prices are balanced for a long period-tends to increase, which means that an increase in prices by a certain amount leads to an increase in the production of these goods to a greater extent.

A rigid or inelastic offer shows that the quantity of products offered changes little or almost nothing when prices increase or decrease. This phenomenon is typical for many products and services in the short term. For example, there is a strict offer for seasonal goods, perishable products that are produced in a short period and are difficult to store in large quantities (fruits, berries). The supply is more inert than the demand, since it is difficult for large producers to switch production to the production of new products in a short time, redistribute technologies, equipment and resources to change the number of products produced. The study of regularities in the dynamics of changes in the supply elasticity coefficient is necessary to predict the volume of production depending on changes in prices.

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### Основы изучения динамики рыночных цен и спроса

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**Ключевые слова и фразы:** институциональные основы предпринимательства; развитие бизнес-институтов; эффективность механизмов поддержки бизнеса.

**Аннотация:** В странах с открытой рыночной экономикой анализ мировых цен имеет глобальное значение для эффективности хозяйственной деятельности производителей товаров, торговых посредников и покупателей. С целью изучения влияния цен на уровень спроса и предложения, эффективность или убыточность экономики сделан анализ основных факторов, определяющих уровень цен. Экономический анализ показал, что они изменяются под воздействием конъюнктуры (соотношения спроса и предложения) рынка. Выявлены механизмы влияния динамики цен на экономическое положение продавцов, покупателей и их рыночные интересы.

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## Career Strategies for Workers Close to Retirement Age

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**Key words and phrases:** pre-retirees; career strategy; mentoring; age discrimination; quality of life; labor activity of older people.

**Abstract:** The article deals with current problems related to increasing the retirement age in Russia and, consequently, the need to continue working for people of pre-retirement age. The purpose of this study was to study the problems of continuing a career for pre-retirees in the current labor market in Russia. The hypothesis of the study is based on the assumption that there are several possibilities for continuing employment for pre-retirees. The main research methods in the article are the analysis of scientific literature and methods of management theory. Based on the results of the study, the authors formulated the main approaches to solving the problems of developing the labor activity of pre-retirees; defined and considered the specifics of career development for older people.

With an increase in the retirement age in Russia, men and women of the 50+ generation are faced with a challenge of continuing their career. According to the Russian Pension Fund, the number of people working before retirement age in Russia is 4.2 million. This includes 2.2 million women who will be 55-60 years old in 2020, as well as 1.9 million men aged 60–65 years. According to the international recruitment Agency Kelly Services, 68 % of Russian applicants want to continue working in order to lead an active professional life, 65 % consider continuing to work as an opportunity to maintain their usual income level, and 53 % associate work with personal development [5]. This raises the following questions: What career strategies do 50+ managers choose? In what niches (industries, specializations, locations) in the modern Russian economy are they really in demand? Are there any examples to follow?

The choice of a career strategy depends on many factors: education, established career, unique experience, qualifications, health status, personal qualities. In principle, there are 3 main areas of activity for a person of pre-retirement age: consulting, entrepreneurship or employment. We consider the advantages and disadvantages of each direction. Consulting as a continuation of labor activity is usually considered by top managers and highly qualified specialists. Whether they are looking for a job after the company's restructuring or are thinking about their future while remaining as a top manager, the decision about the next steps in their career is not easy. As a rule, people of this age have not only built a successful career, but also created a reputation,

acquired connections, contacts, and opinions [1, p. 68]. They expect to maintain the above-average standard of living, they have to cover housing costs and support family members.

One of the solutions is to get into consulting or teaching. Almost every successful executive who has reached high positions can be a teacher or a consultant. They have experience in solving practical problems, and an understanding of the industry and business. A contraindication is inability to listen to potential clients, to adapt their thoughts and experience to their specific requests. As a rule, people with similar qualities stop somewhere in the middle of the career ladder and do not formulate career alternatives for themselves at the age of 50, preferring the chosen path. A while ago, such specialists were sought by consulting companies as heads of industry; some of them became stakeholders.

The situation in the consulting business, as well as in the economy as a whole, has changed significantly [3, p. 100; 4, p. 6]. High competition from qualified experts in in-house positions, reduced budgets for attracting consultants, digital challenges, unstructured and weak consulting market in Russia as a whole – all these factors reduce the likelihood of finding candidates with managerial experience to work as managers or become stakeholders. The same situation is with the job of a teacher. The rate in leading business schools for in-business teachers does not exceed 1,000 rubles per academic hour. This kind of career is not rewarding and can be regarded as occupation “for the soul” or a hobby.

Setting up your own business and shifting from self-employment to entrepreneurship is particularly challenging. This issue requires special research and it is not the topic under consideration in this article. Therefore, we will consider the possibilities of employment, depending on the acquired qualifications.

Managers over the age of fifty are still in demand in the market, and in almost all areas, especially in the industrial sector. Many companies have positions where experience and the number of completed projects are important, for example, positions in the field of high technical engineering, where you cannot do without expertise. However, in order to remain competitive in the labor market, older managers need to follow a certain strategy. One of the successful career strategies of 50+ managers involves strengthening their team with young and active employees.

First, in this case, a 50+ manager can pass on his experience and professional knowledge to young people. This is especially true for the automotive, oil and gas sector S, and natural resource extraction. If a manager wants and can pass on the knowledge of the industry to the younger generation of employees, he will be in demand in the market.

Secondly, if a 50+ manager does not understand something, it can be compensated by his young team. In this case, he does not need to understand all the subtleties of new trends and trends, he can delegate this task to his team.

Another career strategy for managers of the older generation to stay afloat is constant self-training, passing advanced training courses. Senior managers need to be aware of all trends, understand what is happening in the market, and understand digitalization at the level necessary for their position. Many companies are moving into digital technologies, digitalization of production, and if managers do not follow these trends, then companies will simply fly out of the market. With knowledge of trends and a deep understanding of the industry itself, senior managers will be on the market for their weight in gold.

Considering the likely strategies for specialists, it seems most reasonable to go into a certain niche. At the age of 50+, a good niche expertise is the basis for any career strategy. Its availability for top management is a strict requirement regardless of the industry and age.

Further, the choice of career strategy depends on the personal qualities of a candidate. Active candidates who know how to sell their experience, with good recommendations and



cases, may well apply for managerial positions that require strategy or practical experience. But compared to European countries, we have very few active managers of this age who are not tired. Employers are well aware of this, so often candidates of this age are not considered seriously, and their own employees are transferred to status positions of advisers and consultants. If you are actively looking for a job at the age of 50+, you also need excellent self-presentation skills and good networking. Based on our experience with foreign markets, we see that managers of this age in the United States, Great Britain, and Germany are more active. They go into consulting, or less dynamic roles.

Another strategy for professionals is to become mentors. Managers, line managers, and 50+ workers are the most valuable reserve of the national economy. Unfortunately, the labor market is not always aware of this. Older workers tend to have the most valuable knowledge and experience. But transfer of these values is either risky (and what if I lose my irreplaceability?), or is complicated by the existing training system in companies [2, p. 51]. A good choice is the world-wide system of mentoring. For example, in 2018, STEKLONiT JSC (Ufa) conducted a pilot project to organize a mentoring system based on Training Within Industry-training in the workplace-as part of the project "Improving Productivity And Supporting Employment".

The training results of 140 managers and employees resulted in the reduction in the defective products rate from 20 % to 0.2 % (100 times!), the cycle time – by 2 times, commissioning new facility – by 8 times, bringing workers into profession – by 2.5 times. Thus, if the priority program uses skilled experienced managers to build a professional mentoring system in companies, three important tasks can be solved at once: to increase labor productivity, to solve the problem of employment of people of pre-retirement age and to provide the company with qualified personnel able to work efficiently, productively and safely.

Age-based discrimination is rampant in the Russian labor market. The survey showed that employers consider the financial sector (68 %), law (63 %), senior management (55 %), administrative work (43 %) and logistics positions (41 %) the most common areas of activity where the experience of employees of retirement age can be useful [5]. People aged 50+ are an interesting and promising direction in hiring staff. Often, you can offset their disadvantages by choosing the right position and job responsibilities, or by hiring younger assistants for them, or tailoring working hours for them. This is quite costly, but it will pay off in a fairly short time. In addition to economic growth, our honored workers will feel truly deserved and needed by the country.

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### **Карьерные стратегии для работников предпенсионного возраста**

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**Ключевые слова и фразы:** дискриминация по возрасту; наставничество; предпенсионеры; стратегия построения карьеры; трудовая активность пожилых людей.

**Аннотация:** В статье рассматриваются актуальные проблемы, связанные с повышением пенсионного возраста в России и, вследствие этого, с необходимостью продолжать трудовую деятельность людям предпенсионного возраста. Целью данного исследования являлось изучение проблемы продолжения карьеры для предпенсионеров в условиях современного рынка труда в России. Гипотеза исследования заключается в предположении о том, что существует несколько возможностей продолжения трудовой деятельности для предпенсионеров. Основные методы исследования в статье – анализ научной литературы и методы теории управления. По итогам исследования авторами сформулированы основные подходы к решению проблем развития трудовой активности предпенсионеров; определена и рассмотрена специфика развития карьеры для пожилых людей.

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## Features of State Property Management

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**Key words and phrases:** analytics; control; distribution of federal state unitary enterprises by branches of the economy; efficiency of state property management; ensuring professional management; federal real estate; government objects; government agencies; securities; state property management algorithm; unitary enterprises.

**Abstract:** In order to analyze the effectiveness of state property management, the article considers the issues of analytics, management, and distribution of state property by economic sectors to ensure professional management. As a result, an algorithm for managing state property was presented in relation to all objects of state administration, including state institutions, unitary enterprises, federal property securities, federal real estate, and the shares of the Russian Federation in the authorized capital of business companies and partnerships. The distribution of federal state unitary enterprises by branches of the economy is presented.

The government of any country is always interested in effective management of state property, which is why the structures of analysis, management, training and certification of managers are formed to implement such an important principle of management as ensuring the professionalism of management.

Administrative principles of effective management are applied to all objects of state administration, especially to such as state institutions, unitary enterprises, Federal-owned securities, Federal real estate, and shares of the Russian Federation in the authorized capital of business companies and partnerships. The state property management algorithm is presented in Fig. 1.

The state performs a number of important functions in the real estate market, such as:

- 1) implementing ideological and legislative initiatives (concepts for the development of certain types of market and programs for their implementation);
- 2) investing in priority sectors of material production, housing construction and socio-cultural sphere;
- 3) participating in the market sale of housing certificates, state buildings and structures and other real estate objects;
- 4) acting as the main Issuer of state and municipal securities secured by real estate;
- 5) acting as a regulator and Supreme arbiter in disputes between participants in the real estate market;
- 6) monitoring stability and security of the real estate market, registering rights and

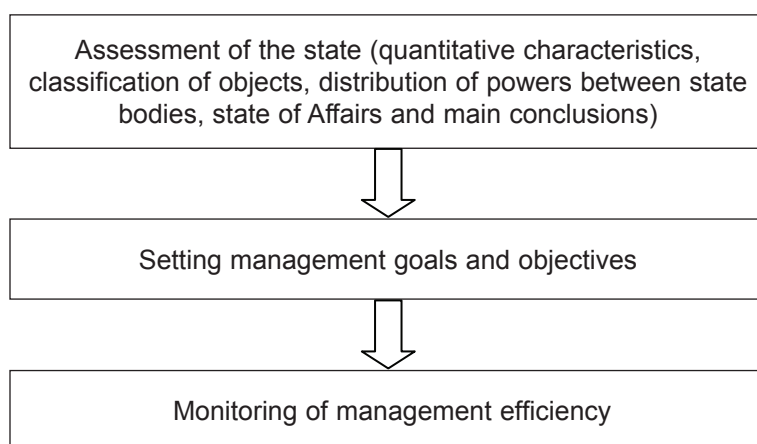


Fig. 1. Block diagram of the algorithm for state property management

Table 1. The distribution of federal state unitary enterprises by sectors of the economy

Economy sector	The number of federal state unitary enterprises	The number of joint stock companies with the participation of the Russian Federation
Non-industrial	1,424	1,162
Industries, including:		
Mechanical engineering	292	245
Textile	59	11
Food	27	46
Metallurgical	14	31
Chemical and petrochemical	47	36
Forestry	94	35
Others	120	112
Construction	252	160
Agriculture	410	397
Transport and communication	338	269
Other industries	440	288
Total	3,517	2,950

transactions with real estate.

One can consider the mechanism of state regulation of the real estate market as a system of two elements:

- state and municipal bodies and organizations;
- state and local regulations.

A complex mechanism of state property management is carried out with the help of a set of levers based on direct Directive influence, as well as on the motivation of economic and material interests.

Management methods take into account the governmental and administrative nature

of public administration. They tend to express the legal powers inherent in the state, the government, and its executive bodies.

One can consider the following ways to improve the efficiency of state property management:

1) collecting of additional revenues to the Federal budget from asset management and privatization;

2) creating conditions to enhance the investment process;

3) restructuring and modernizing the state property structure;

4) getting small and medium-sized businesses involved in the privatization process.

Currently, the state has a significant potential to optimize the structure of state assets. The analysis of indicators from Table 1 provides information about the irrational structure of the distribution of state assets by industry. It is quite clear that there are a significant number of state-owned enterprises in such sectors as engineering, transport, education, and research. At the same time, a large presence of state-owned enterprises in the processing and food industry, construction and trade in general is not advisable.

The concept of increasing efficiency and further improving the state property management system includes the transfer of management and privatization of part of the state property by independent businessmen. Obviously, the main rights and control over the effectiveness of state property management remain the responsibility of the relevant state property management bodies and local administration.

An important result of the implementation of the concept of increasing efficiency and further improving the system of state property management will be the redistribution of the array of state property. An important problem is the task of transferring the social sphere through the system of public-private partnership with the redistribution of cash flows. These measures will create a transition to the system management of the state property complex.

Improving the management system of the state property today is carried out in a competitive market, the introduction of digital technologies and the widespread use of artificial intelligence technologies, which should increase the efficiency of the use of state property, increasing its competitiveness in the Russian economy. Today, improving the management of state property is especially important because of the simultaneous presence of private property, state property, joint and foreign property in the competitive field.

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### Особенности управления государственной собственностью

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**Ключевые слова и фразы:** алгоритм управления государственной собственностью; аналитика; государственные учреждения; обеспечение профессионализма управления; объекты государственного управления; распределение федеральных государственных унитарных предприятий по отраслям экономики; унитарные предприятия; управление; федеральная недвижимость; ценные бумаги; эффективность управления государственным имуществом.

**Аннотация:** С целью анализа эффективности управления государственным имуществом в статье рассмотрены вопросы аналитики, управления, распределения государственной собственности по отраслям экономики для обеспечения профессионализма управления. В результате был представлен алгоритм управления государственной собственностью применительно ко всем объектам государственного управления, особенно к таким как государственные учреждения, унитарные предприятия, ценные бумаги, находящиеся в федеральной собственности, федеральная недвижимость, доли Российской Федерации в уставных капиталах хозяйственных обществ и товариществ. Представлено распределение федеральных государственных унитарных предприятий по отраслям экономики.

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