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ОРИГИНАЛЬНАЯ

## МЕТОДИКА ВНЕДРЕНИЯ HR-АНАЛИТИКИ В УСЛОВИЯХ ЦИФРОВОЙ ТРАНСФОРМАЦИИ

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**Аннотация.** Непрерывные изменения, связанные с переходом к цифровой экономике, оказывают значительное влияние на процессы, происходящие в сфере управления человеческими ресурсами. Большую популярность приобретает HR-аналитика, которая позволяет получить объективные данные о ситуации, в которой находится организация в реальном времени и оперативно скорректировать мероприятия в области совершенствования работы с персоналом. Инструменты HR-аналитики позволяют анализировать накопленные данные, проводить бенчмаркинг в аналогичных отраслях, определять взаимосвязи между факторами, влияющими на производительность сотрудников, а также прогнозировать результативность персонала. Благодаря разработке и внедрению эффективной системы аналитики персонала руководители HR-службы получают более точные, измеримые и сопоставимые данные о человеческих ресурсах. Целью исследования является рассмотрение изменений, происходящих в деятельности служб управления персоналом в условиях цифровой трансформации, а также разработка методики внедрения HR-аналитики в организации как одного из важнейших инструментов измерения эффективности и прогнозирования изменений в области человеческих ресурсов. Методологической базой исследования являются работы отечественных авторов, посвященные вопросам HR-аналитики и ее взаимосвязи с принятием управленческих решений в компании. Анализ теоретической базы предполагает применение таких методов, как анализ библиографических источников, сравнение, методы систематизации. В качестве основного результата была разработана методика внедрения HR-аналитики в организации, основанная на сборе и обработке больших данных с применением инструментов искусственного интеллекта и машинного обучения. Теоретическое исследование в области управления персоналом, позволило выявить основные цели и направления развития HR-служб в условиях становления цифрового пространства.

**Ключевые слова:** аналитика персонала, искусственный интеллект, цифровая трансформация, HR-бенчмаркинг, HR-метрики

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ORIGINAL PAPER

## METHODS OF HR-ANALYTICS IMPLEMENTATION IN THE CONDITIONS OF DIGITAL TRANSFORMATION

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**Abstract.** Continuous changes associated with the transition to a digital economy have a significant impact on the processes taking place in human resource management. HR analytics is becoming more and more popular, as it provides objective real-time data on the situation of the organization and enables quick adjustments in the improvement of work with personnel. HR analytics tools allow to analyze the accumulated data, conduct benchmarking in similar industries, determine the relationship between the factors affecting the performance of employees, as well as predict the personnel performance. HR managers gain more accurate, measurable and comparable data on human resources through developing and implementing efficient workforce analytics system. The purpose of the study is to consider the changes taking place in the activities of HR services in the context of digital transformation, as well as to develop a methodology for implementing HR analytics in the organization as one of the most important tools for measuring performance and forecasting changes in the field of human resources. The works of domestic authors devoted to the issues of HR-analytics and its relationship with the adoption of management decisions in the company are the methodological basis of the research. The analysis of the theoretical base involves the use of such methods as analysis of bibliographic sources, comparison, methods of systematization. As the main result, a methodology for implementing HR analytics in the organization, based on the collection and processing of big data using artificial intelligence and machine learning tools, was developed. Theoretical study in the field of personnel management allowed to identify the main objectives and directions of HR services development in the emergence of the digital space.

**Keywords:** HR analytics, artificial intelligence, digital transformation, HR benchmarking, HR metrics

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## Introduction

In the context of continuous transformations, the adoption of high-quality and effective management decisions directly depends on the completeness and reliability of the information received. The rapid development of digital technologies has a significant impact on the way we do business, the ability to extract and transform data, and present information in a format that allows you to quickly respond to changes. It becomes obvious that the widespread introduction of digital technologies is not only a modern trend, but also a necessary condition for maintaining a high level of competitiveness.

Digitalization cannot be carried out without a comprehensive change in all business processes. It is not enough to carry out the necessary technological re-equipment and introduce end-to-end technologies into the enterprise activities. The success of digital transformation will also depend on a change in established forms of management, changes in corporate culture, retraining of employees, and attraction of personnel with digital skills and competencies.

In this regard, the HR function plays a special role in the enterprise digitalization. The head of human resources becomes a strategic business partner who, together with the CEO, leads the processes associated with digital transformation. The established principles of human resource management in the new paradigm, focused on the introduction of innovative approaches to processes, are becoming ineffective. Therefore, in the new conditions, the personnel management system is primarily subject to change. Digitization penetrates the HR sphere and makes adjustments to the tasks that the subdivision faces [1].

Studies of the HR sector digitalization in Russia have shown an extremely low readiness of enterprises to implement digital tools. In 2019, an analytical survey to assess the level of digitalization of Russian companies conducted by SAP CIS and Deloitte among 434 companies led to the conclusion that more than half of the surveyed companies do not use digital tools in the HR sphere and belong to the "HR on paper" category or there is fragmented digitalization. Education, construction and energy are among the most lagging industries, and banking and financial organizations, IT and telecom can be called the most progressive ones. At the same time, most organizations are aware of the importance of introducing digital tools in the field of personnel management, and also evaluate the benefits that result from the automation and digitalization of processes in HR. This is confirmed by the growing investment in digital HR technologies. According to the KMPG study "The Future of HR 2019", 49% of HR departments have invested financial resources in IT products for human capital management. In the near future, 53% of HR leaders plan to invest in process automation solutions, and 47% in artificial intelligence.

## Results and discussion

*Changes taking place in the activities of personnel management services in the context of digital transformation*

Digitalization contributes to a change in the basic principles of the HR departments work, in connection with this, new tasks arise that should be reflected in the HR strategy. The main tasks of the HR service in the context of digital transformation [2]:

- creation of an internal corporate environment conducive to the development of digital thinking and the exchange of digital skills and experience;

- automation of HR processes using IT tools;
- implementation of a phased transition to the introduction of predictive analytics tools.

In order to achieve the set goals, it is necessary to carry out gradual changes in the operational functions of the HR service.

At the first stage, the workspace is transformed. HR services are actively implementing HCM (Human Capital Management) systems that allow integrating data into a single platform and managing human resources in the most efficient way. Digital assistants appear in the form of HR bots that provide support to employees at any time in a convenient way, thereby freeing employees of HR departments from routine work [3].

The second stage is the reengineering of the corporate employee training system. Training should be as effective as possible in the shortest possible time. To do this, LMS systems are being actively implemented, allowing employees to gain skills on the job.

At the third stage, processes in recruitment are changed. Thanks to digital technologies, personnel search is becoming faster and more automated. Models of digital algorithms are widely used, which allow scoring resumes based on specified parameters [4].

The final step in the process of building a digital environment for an HR department is the formation of high-quality predictive HR analytics [5].

According to the company's research, KMPG "The Future of HR 2019", which was attended by 1,200 HR leaders from 64 countries, more than half of those surveyed (60%) plan to invest in predictive analytics in the near future. The study mentions that in the near future there will be a large gap between those who are actively involved in the digital transformation process and those who observe, but do not implement innovative technologies. At the same time, while the leaders of digital transformation will move forward significantly, observers will not even have time to realize this gap.

### *Goals and algorithm for implementing HR analytics*

Among the trends in the field of personnel management, HR analytics occupies a leading position. However, the lack of experience in building a system for researching HR processes can cause a number of difficulties. Challenges faced by HR when implementing HR analytics [6]:

- processes in the field of personnel management are complex and heterogeneous, in connection with this, data extraction and processing can take a long time;
- low level of specialists' training in the field of HR-analytics;
- lack of financial resources for analytical systems implementation and support;
- low quality of collected information about personnel;
- lack of a clear understanding of the methodology and goals of implementing HR analytics;
- low level of the enterprise and technological equipment digital potential.

Partially solving the identified problems helps to determine the algorithm for implementing HR analytics, setting goals and defining a step-by-step methodology.

The process of implementing HR analytics should be carried out in accordance with the following algorithm [7]:

- 1) setting business questions;
- 2) identifying problems and search for solutions to the tasks set;

- 3) extracting, transforming and loading data;
- 4) competent interpretation and integration of results;
- 5) regular analysis.

HR analytics allows you to consider personnel management in two aspects (*table 1*).

Table 1

**Aspects of personnel management within the framework of HR analytics**

Internal aspect	External aspect
1. Motivation	1. Labor market
2. Efficiency and productivity	2. Wage level
3. Involvement	3. Demographic situation
4. Skills and potential	

Source: compiled by the authors based on [10]

Among the goals of HR analytics are [8]:

- 1) providing previously unknown information and identifying key data;
- 2) search for relationships and factors that influence performance indicators;
- 3) identifying weaknesses and developing recommendations for their elimination;
- 4) making timely decisions based on forecasts of analytical models.

*HR analytics implementation methodology*

The transition to the use of HR analytics in the company is carried out in stages, starting with the personnel data collection. The quality of the final results depends on how reliable, diverse and structured the data is. Today, most organizations collect information about personnel in disparate databases that are not united with each other. In this regard, it is necessary to pay special attention to extracting, combining into a single storage and converting information suitable for analysis. In the future, this will make it possible to determine the relationship between various indicators, build forecasts and provide information in the shortest possible time for planning activities in the field of personnel management [9]. Consolidated data serve as the basis for calculating metrics that reflect the effectiveness of the HR department. All metrics that the HR department calculates can be divided into 3 conditional levels:

- 1) Basic level. It includes statistical metrics that allow you to give a general description of all human resources in the company.
- 2) Average level. Data at this level provide information about the employees' productivity and efficiency, they are collected to assess the staff value.
- 3) The highest level. Unlike the previous levels, the metrics are not just descriptive and reflect the HR function operational activities, they determine the business development strategy. These include indicators that evaluate the return on investment in personnel, and visible correlation with various business processes.

The work on calculating the metrics of each level should begin with defining a pool of business issues that will be addressed using HR analytics tools. It should be noted that there is no reference set of HR metrics that can be used in full. Depending on the chosen strategy, the most priority tasks, the size of the organization, the field of activity, as well as the stage of business development, the set of indicators will be individual for each organization. A single rule for working with HR metrics for any company is the need for regular and systematic evaluation of the information received. Measuring indicators in dynamics allows you to identify the causes of ongoing

events, determine existing trends and predict future ones [10]. This will allow you to work on improving HR processes and prevent the occurrence of unfavorable events. As the company grows, the functions of the HR department expand, new business processes emerge, and the market situation changes, the set of applied metrics should be reviewed.

At the next stage in the company HR analytics development, the results obtained are compared with those of the leading companies in the industry. HR benchmarking allows you to assess the level of human resource management efficiency in an organization and compare data with leaders in similar areas. Regular benchmarking helps HR departments to determine the direction of business development and implement best practices in the field of personnel management. Despite the obvious advantages of this tool, the majority of Russian enterprises are not ready to place data on human resources in the public domain. Another difficulty that organizations face when conducting benchmarking is the lack of a clear methodology for conducting competitive analysis. Since the comparison of results is carried out in the field of human resources, some data may be subjective and not reflect the real situation in the organization, which may lead to incorrect conclusions.

The criteria by which benchmarking is carried out in HR practice are divided according to the areas of HR departments work [11]:

- 1) personnel selection and adaptation (for example: staff turnover, deadlines for closing vacancies, the cost of filling vacancies, the cost of passing a probation period by an employee);
- 2) the budget of HR departments (for example: expenses for paying for the services of external providers, the average level of wages);
- 3) development and training of employees (number of training hours per employee, training costs per employee, return on investment from employee training);
- 4) talent management (for example, the percentage of key positions for which there is a personnel reserve, the percentage of internal transfers to vacant positions of participants in the personnel reserve).

Recently, businesses expect HR departments to work not only with qualitative data, but also with quantitative ones. That is why modern HR departments are increasingly striving to measure all processes occurring in HR services [12]. Statistical analysis methods come to the rescue. As the organization grows and data accumulates, companies can move to the third phase of implementing HR analytics. This stage is associated with the search for interrelations and interdependencies between indicators, as well as with the assessment of their impact on the staff performance. Correlation and regression are two of the most important statistical tools in HR practice. Correlation is the simplest way to find relationships. This method allows you to determine the presence of linear dependencies between quantitative variables. The correlation coefficient reflects the degree of connection between qualitative indicators. The strength of the connection is determined using the Chaddock table. The Chaddock scale is a classic tool that is used to draw conclusions about the presence of relationships between variables. The characteristic of the strength of connections, depending on the indicator obtained, is presented in *table 2*. Linear regression allows you to determine the degree of influence of one variable on another, under certain circumstances.

Regression can be paired, in this case only two variables are analyzed, and multiple, when several indicators and their relationship with some variable are analyzed.

Table 2

**The Chaddock scale for the qualitative assessment of the strength of connections**

The strength of connections	Characteristics of the strength of connections
less than 0.3	weak
from 0.3 to 0.5	moderate
from 0,5 to 0.7	notable
from 0.7 to 0.9	high
more than 0.9	very high

Source: compiled by the authors based on [13]

After conducting a correlation-regression analysis, the HR service can determine the impact of personnel HR metrics on the company's financial performance and identify the correlation between these data. These tools are very important at the initial stages of the HR analytics implementation [14]. However, in the context of digitalization, it becomes obvious that simple statistical tools used to describe retrospective data and reflect a direct relationship are not enough. Digital transformation is forcing HR departments to look for new methods of information analysis and reduce the time for processing requests. Depending on the goals and available methods, analytics can be divided into descriptive, predictive and prescriptive. Descriptive analytics involves the collection, systematization and generalization of HR data, as well as consideration of their dynamics, identification of deviations from the norm and comparison during benchmarking. Predictive and prescriptive analytics are aimed at predicting the dynamics of indicators in the future and developing recommendations based on data on upcoming changes [15]. It is important to note that for descriptive analytics, using mathematical and statistical tools is enough for HR services. Building high-quality predictive analytics is only possible using digital technologies such as artificial intelligence and machine learning [9].

Machine learning and artificial intelligence tools allow solving a number of tasks in the field of predicting personnel behavior, all these tasks are divided into 3 groups and are presented in table 3.

Table 3

**Tasks solved by artificial intelligence in the field of personnel management**

Personnel selection and evaluation	Personnel training and development	Employee retention
1. Forecast of shortage of personnel with the necessary qualifications. 2. Determination of requirements for candidates based on the profiles of high-potential employees. 3. The need to open vacancies for certain positions to increase the productivity of departments.	1. Identifying of the reasons for the decrease in the learning rate. 2. Forecasting the readiness of groups of employees for career movements. 3. Determining the need for vocational training and re-training. 4. Determining the factors that influence the success of leaders.	1. Professional burnout prediction. 2. Prediction of dismissals in the next 3-6 months. 3. Determination of the factors influencing the increase in the level of fluidity. 4. Forecasting an increase in the level of absenteeism in specific units. 5. Prediction of a decrease in the involvement level.

Source: compiled by the authors based on [6]

To build models using artificial intelligence, in addition to simple linear regression, more complex statistical methods are used to solve classification problems. The simplest of these is logistic regression. Logistic regression is the most common method for predicting employee turnover. It can not only predict the likelihood of staff outflow, but also identify the reasons for dismissal, as well as give recommendations for optimizing the situation [16]. The analytical model gives such forecasts on the basis of statistical data. These methods also provide the ability to search for non-obvious relationships between parameters. For example, as a result of analyzing data from various departments, the model can reveal a strong influence of the level of social interaction on employee productivity [17].

The final step in the HR analytics implementation is the data visualization and the ability to present it in real time in the form of HR dashboards. An HR dashboard is a panel that allows you to visualize the key results of personnel performance, as well as promptly inform management about changes. Depending on the goals, dashboards are divided into operational, analytical and strategic ones. An HR dashboard is an important tool for managing human resources, as it allows you to identify trends and problem areas. At this stage, it is important to identify and use only those metrics that are consistent with the business development strategy.

**Conclusion**

The main modern trend in the field of human resource management is digitalization. This trend is changing the basic principles of the work of HR services, which entails the need to quickly adapt to modern conditions. The main hallmark of high-performing companies in the digital world is the ability to learn quickly. Organizations should actively implement innovation technologies, apply new services and software products, analyze information about business processes using advanced analytics tools, while identifying non-working tools in a timely manner and replacing them with more efficient ones. As part of the study, it can be noted that digitalization in the field of personnel management is in its infancy.

One of the digital tools that help management measure the quality of human resources and build forecasts based on a large amount of various data is predictive HR analytics. The advantages of using predictive HR analytics include: an increase in the speed and quality of decisions made, an increase in employee productivity, a reduction in the number of errors and an increase in the objectivity of information that is formed based on the analysis of statistical data. With all the benefits derived from the introduction of predictive HR analytics, this process in Russian enterprises is very slow. Among the main reasons, one can single out: the lack of unified databases for storing data in the form of information and ERP systems, the low willingness of companies to invest large amounts of money and time, the incompleteness and unreliability of the information available, the lack of qualified personnel with digital skills, as well as a lack of the methodology understanding for implementing HR analytics tools.

As part of the study, a methodology for implementing HR analytics in an organization is proposed, which includes 4 stages: collecting, extracting and processing data, comparing calculated metrics with leading organizations in the industry, and conducting correlation and regression analysis, in order to identify strong and weak relationships between parameters, the development of

self-learning models based on artificial intelligence to solve problems of predicting changes.

#### Authors' contribution

The authors made an equal contribution to the research: collection and analysis of the material; definition of goals and objectives, research methods; formulation and scientific substantiation of conclusions, registration of key research results in the form of an article.

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