

**II International Scientific Conference GCPMED 2019  
"Global Challenges and Prospects of the Modern Economic Development"**

**HR-STRATEGY, BASED ON THE APPLICATION OF DATA  
MINING ALGORITHMS**

E. V. Pogorelova (a), O. V. Yudina (b), M. A. Kolotilina (c)\*  
\*Corresponding author

(a) Samara State University of Economics, Soviet Army street, 141, 443090, Samara, Russia, jour.ru@gmail.com

(b) Samara State University of Economics, Soviet Army street, 141, 443090, Samara, Russia, ovyudina@bk.ru

(c) Samara State University of Economics, Soviet Army street, 141, 443090, Samara, Russia, ms.kolotilina@bk.ru

*Abstract*

Present research examines characteristics and practical applicability of big data algorithms and tool in the context of HR-analytics. Taking into consideration the complexity of managing with large amount of data, the tools and technologies of OLAP systems are considered in the context of using the structure of big data, which will speed up the calculation of HR - metrics for headline indicators. This research designates qualitative and quantity relatives of staff performance in parallel with production business processes. The principal aim of research is exposure of basic key efficiency target works in personnel management, and the selection of alternative solutions by tool type for their calculation. The math of headline indicator are calculated on the basis of liaison protocols for personnel management processes and questions contained in them. Positive points of integration processes between corporate information systems are highlighted, it is suggested to take these factors during building and calculating KPI-indicators, they let to compare similar economic processes, to regard exit of coefficients from permissible limit, to control the effectiveness. The research is based on the comparison of quantitative HR - metrics with the main criterion, which is specified in the indicator. Key objectives and lines of development and control by human resources of OJSC «RZD» are shown in connection with activities of business units of "RZD" holding are shown.

2357-1330 © 2020 Published by European Publisher.

**Keywords:** CC ACSL, methodology PDCA, reports, HR-metrics, people management, statistical profile.



This is an Open Access article distributed under the terms of the Creative Commons Attribution-Noncommercial 4.0 Unported License, permitting all non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

## 1. Introduction

OJSC "RZD" is a developing industry in Russia, having the necessary infrastructure, seeks to use modern platforms, technologies, skills set, institutional and instraumental settings for development in the digital economy ecosystem. Reviewing the problem of personnel management, generation and allocation of key indicators KPI (Chadwick & Li, 2018), units of personnel management simulate achievements of reference parameters. The process modeling in the company is carried out according to ARIS methodology. Transparent industrial processes are based on program sequence (Turriago-Hoyos, Thoene, & Arjoon, 2016). In view of dynamic growth of economic digital processes in the company are necessary to underline qualitative and quantity relatives of staff performance. There is about 800 thousand of people in the company. The calculated stages of the selected indicators require modern tools which would allow, as well, the visualization of reports. In the capacity of automated system of personnel management in OJSC "RZD" is Common corporate automated control system of labor (further CC ACSL) (Matusova & Gogolova, 2017). Created single information space with computer workstations for personnel management specialists of various levels, allows maintaining and monitoring all necessary list of personnel documents, and also the whole set of works on personnel management. In CC ACSL carried out consistent system of reports and friendly graphical user interface. Therewith, in CC ACSL is developed consolidated accounts. The value of CC ACSL system is its possibility of integration with various applications as XML files (table 01).

The work with base performance indicator of personnel management requires an effective management policy for each business unit. Based on work's monitoring on personnel management for 2018 year, have been identified the next headline indicators.

**Table 01.** Core indicators KPI

Indicator name	Performance indicator
<b>The quantity of factories with manning of basic producer group less than 97% (only 1 group)</b>	Staffing level exclusively of employees absent on leave for childcare
	Turnover of employees amid dismissed by agreement between the parties
<b>Employee pool</b>	The head of nomenclature alternateness
<b>Shutdown of vacancies and nomination of candidates</b>	The quantity of free head of nomenclature with employment period less than 1 year
	The percent of long vacancies from nomenclature
	Number of resignations during the first year of employment ( such as retirement), mutual agreement of the parties, disciplinary case
<b>Quantitative composition</b>	Substitution by experts of occupations requiring higher education
	Substitution by experts of occupations requiring secondary vocational education
	The quantity of workers with inconsistent level of education on engineering and technical positions
	The quantity of workers with inconsistent scope of education on engineering and technical positions

<b>Personnel rating</b>	Employees share with the mark of corporate competences and consist in base reserve
	Employees share with the mark of corporate competences and consist in corporate reserve
<b>Training and employee development</b>	Realization of training program, retraining, training of workers
	The training in study center
	Performance to plan of workers further training
	Performance to plan of management and key personnel further training
	The quantity of workers involved in safety of traffic and involved in overdue date of further training
	The quantity of management and key personnel with expired time of education by required programs
<b>Young professionals and youth</b>	The quantity of contract student with higher education used in workforce position for more than 1 year
	Percent of youth under the age of 35
<b>HR management</b>	The quantity of workers reinstated in a job under the court decision, from headcount
	The quantity of workers which have More than 50 vacation days

Each of the indicators KPI is calculated separately in compliance with qualitative and quantity relatives (Zámečník, 2015) under each unit of OJSC «RZD». Company OJSC «RZD» makes much of staff development strategies and improving strategic performance.

## 2. Problem Statement

Given the complexity of managing with large amount of data generated in CC ACSL, data can be extracted for discover knowledge and support decision making, strategic aim is the consider of possibility for applying Data Mining algorithms and apply the tool (Simek & Sperka, 2019) for minimize labor costs during realization of personnel policy and create the most favorable conditions for information services of specialists under preparing and making timely and reasonable decisions by them.

## 3. Research Questions

The research consists in searching and testing of algorithms Data Minig, which allow to examine problems of personnel management based on the company's identified key indicators using Deductor. Present research examines process management and management innovations in the staff field, pre-configuring the increase of innovative company facilities, identify a set of personnel innovations, implementing a process approach to management, and establish their relationship with the indicators of innovation activity of the company. It is regarded the problem touching the increase of innovative company facilities of OJSC «RZD» as necessary condition for development of new type of economy in conditions of digitization of the Russian Federation.

#### **4. Purpose of the Study**

Data export from CC ACSL allows to put into practice KPI key indicators calculation on consolidated data in Unified Data Repository. Of the OLAP-reviewed technologies and software tools, Deductor is discussed as an example, and supports variety of scripts, visualization. The uploaded XML data is distributed to structured files that include HR-metrics by disciplines in the business process, line organisations, works, number of personnel from present unit, dates for quarters, number of people fired. Conducted analysis of one of key indicators – the number of enterprises with staffing of the main production groups less than 97%. In this case, the production group is considered groups of working specialties.

#### **5. Research Methods**

Essential methods of research:

- first step is realized by methods of analysis of existing approaches, detailed study of basic issues according to interaction regulations for formation of key indicators of HR-metrics.

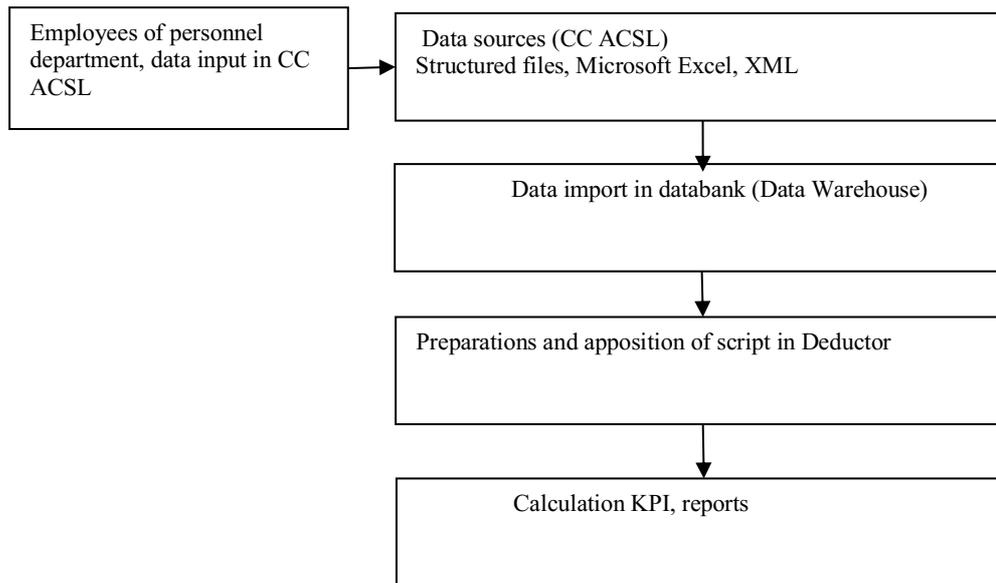
- second step include selection of technics Data Mining for analysis KPI and engineering of data integration technology

- third step include the analysis and calculation of key indicators, collection and unloading of data from CC ACSL. Develop and implement a data warehouse for importing XLM files. Overlay a key figure calculation script in the Deductor tool Preparing reports.

#### **6. Findings**

The success in addressing strategic and operational challenges depends on staff management. The development of the HR-business model is made up from overall company policy. It should not only ensure the efficiency of basic personnel processes, but also contribute to the development of personnel potential, professional and corporate competencies, the formation of modern corporate culture (Bachtiar, 2017). Each key indicator is identified and calculated according to clear regulated actions. Any performance indicator should be reflected in the process as a change to the regulatory document. KPI determination took place according to the regulations separated from each interaction process.

It is possible to use OLAP tools or specialized systems focused on data consolidation tasks to calculate headline indicators. To create a key figure calculation script in the selected tool, you must import the necessary HR metrics from CC ACSL as XML files, clean up, and convert the data. The cleaned data is imported into the created data store of the selected tool. The selected tool contains everything necessary to calculate the quantity characteristics of HR-metrics (Figure 01).



**Figure 01.** Technology of data integration

## 7. Conclusion

In present company as follows from the analysis of using qualitative and calculation quantity relatives KPI, annual tracking of the trend of changes of these indicators by the structural division of OJSC "RZD" is one of the main tasks of the personnel unit.

Extracted headline indicator – professional staffing across all directions reflects many qualitative indicators, such as complacency from profession, interest on profession, motivation, employees happiness, quality of individual competencies or performance monitoring of employees performance. Therefore, the article addresses the problems with the use of mathematical and statistical methods of analysis to measure these qualitative values. The main tool used in this process is the analysis of metadata concentrating in CC ACSL and its use in the preparation of motivational programs. The article also discusses the algorithm of analysis of the indicator.

The research is based on the comparison of quantitative HR - metrics with the main criterion, which is specified in the indicator (percent of factories with staffing less than 97%). HR- metrics are divided into attributes and measurements, and at the intersection - facts are obtained. In this case attributes are the name of profession, measurements – direction of the company. The number of people working according to these professions for the chosen time period will be facts. And the weight indicator will be 97%, which is taken as the main calculated goal. As a result, the facts will be compared with the target of 97%. For comparison and calculation of the share of enterprises with staffing of groups in working specialties the following conditions will be taken:

Quantity of people working in present work specialty  $\leq 97$ ;

Quantity of people working in present work specialty  $> 103$ ;

Quantity of people working in present work specialty  $> 97$ .

Using the tool, the indicator was calculated - The percent of enterprises with staffing of the main production groups less than 97% (table 02).

**Table 02.** The percent of enterprises with staffing of the main production groups less than 97%

Name of profession	%	Direction
Examiners - car repair men	98,7	Direction of infrastructure
Track serviceman	96,7	
Electricians	104,1	
Electromechanics	99,5	
Machinists and assistant drivers of electric trains	99,2	Motor-carriage direction
Track serviceman	97,3	Direction for track repair
Shunting masters	97,9	Direction
Station duty officers	107,1	
Locomotive operators	98,3	Direction of draft
Assistant drivers	100,8	
Electricians of contact network	99,4	Operation of Direction of Energy Supply
Machinists of railcar	98,8	
TOTAL:	99,0	

## References

- Bachtiar, M. (2017, December). Analysis of performance measurement at HR-GR Department using the balance scorecard method. *In IOP Conference Series: Materials Science and Engineering* (Vol. 277, No. 1, p. 012006). IOP Publishing.
- Chadwick, C., & Li, P. S. (2018). HR systems, HR departments, and perceived establishment labor productivity. *Human Resource Management*, 57(6), 1415-1428. <https://doi.org/10.1002/hrm.21914>
- Matusova, D., & Gogolova, M. (2017). Using of new management approaches in the field of personal marketing in the transport company. In M. Drusa, I.Yilmaz, M. Marschalko (Eds.), *World Multidisciplinary Civil Engineering-Architecture-Urban Planning Symposium. IOP Conference Series – Materials Science and Engineering*, 245(4), 042027. Bristol: IOP Publishing. <https://doi.org/10.1088/1757-899X/245/4/042027>
- Simek, D., & Sperka, R. (2019). How robot/human orchestration can help in an HR department: A case study from a pilot implementation. *Organizacija*, 52(3), 204-217. <https://doi.org/10.2478/orga-2019-0013>
- Turriago-Hoyos, A., Thoene, U., & Arjoon, S. (2016). Knowledge workers and virtues in Peter Drucker's management theory. *Sage Open*, 6(1). <https://doi.org/10.1177/2158244016639631>
- Zámečník, R. (2015). Human resources controlling as a tool for measuring human resources key performance indicators. In E. Pastuszková, Z. Chrová, J. Vychytilová, B. Vytrhlíková, A. Knápková (Eds.), *Proceedings of the 7th International Scientific Conference on Finance and Performance of Firms in Science, Education and Practice* (pp.1681-1695). Zlín: Tomas Bata University in Zlín.