Економіка

UDC 331.103.15: 658.13

Chatchenko Olga

PhD in Economics, Associate Professor of the Department of Economics

State University of Information and Communication Technologies

Чатченко Ольга Євгенівна

кандидат економічних наук, доцент кафедри економіки

Державний університет інформаційно-комунікаційних технологій

ORCID: 0000-003-0618-339X

Kubai Oksana

Candidate of economic sciences, Associate Professor,

Associate Professor of Agrarian Management and Marketing Department

Vinnytsia National Agrarian University

Кубай Оксана Григорівна

кандидат економічних наук, доцент,

доцент кафедри аграрного менеджменту та маркетингу

Вінницький національний аграрний університет

ORCID: 0000-0001-5099-489X

Kyrchata Iryna

Candidate of Economic Sciences, Associate Professor,

Associate Professor of the Department of Economics and Entrepreneurship

Kharkiv National Automobile and Highway University

Кирчата Ірина Миколаївна

кандидат економічних наук, доцент,

доцент кафедри економіки і підприємництва

Харківський національний автомобільно-дорожній університет

ORCID: 0000-0002-0270-1586

Shevchenko-Perepolkina Radyslava

PhD in Economics, Associate Professor,
Associate Professor of the Department of Business and Tourism Management
Izmail State University of Humanities

Шевченко-Перепьолкіна Радислава Іванівна

кандидат економічних наук, доцент,
доцент кафедри управління підприємницькою та туристичною діяльністю
Ізмаїльський державний гуманітарний університет
ORCID: 0000-0001-8665-6702

THE INVESTMENT MODEL OF THE ENTERPRISE PERSONNEL COSTS BASED ON ABC-XYZ ANALYSIS
ІНВЕСТИЦІЙНА МОДЕЛЬ ВИТРАТ НА ПЕРСОНАЛ ПІДПРИЄМСТВА НА ОСНОВІ АНАЛІЗУ ABC-XYZ

Summary. *A model of personnel costs was built based on the criteria of personnel efficiency in order to increase the competitiveness of an industrial enterprise on European markets. Social costs, as a separate category, require a clear definition of the structure and classification of these costs, taking into account the requirements of financial, tax, management accounting and international experience. The potential ability to meet such needs of various social groups directly depends on the volume and efficiency of the enterprise's activities, which generally affects: the total amount of taxes, contributions and other mandatory payments; current expenses of the enterprise; the amount of profit that can be directed to the realization of social and other needs. The purpose of the article is to study methodological and organizational aspects of the analysis of personnel costs in the enterprise management system. ABC-XYZ toolkit analysis, construction of Lorenz curve, Matrix of personnel management tools were used to determine ways to optimize the personnel of the industrial*

enterprise, which will contribute to increasing the efficiency of the enterprise as a whole. The implementation of proposals for ranking employees based on ABC-XYZ analysis will allow economic entities in the context of crisis phenomena to respond quickly to changes in its market environment in conditions of uncertainty. The methodical approach to the ranking of personnel by groups (AX, AY, AZ, BX, BY, BZ, CX, CY, CZ) has been improved based on the use of the Lorenz curve and the double tangent method, which, unlike the existing ones, allows taking into account the criteria of personnel efficiency (labor productivity and work stability) for the purpose of strategic development of the industrial enterprise as a whole. Based on the results of the study, recommendations were developed for the management of employees of the industrial enterprise, especially in terms of measures to increase labor productivity and stability of the staff's work. The implementation of the considered proposals regarding the ranking of the personnel of enterprises will allow to build a basis for the mechanism of ensuring the development of the personnel of enterprises.

Key words: *personnel costs, labor productivity, work stability, ABC-XYZ analysis, loyalty, management.*

Анотація. *Побудовано модель витрат на персонал на основі критеріїв ефективності діяльності персоналу з метою підвищення конкурентоздатності промислового підприємства на Європейських ринках. Соціальні витрати, як окрема категорія, вимагає чіткого визначення структури та класифікації даних витрат з врахуванням вимог фінансового, податкового, управлінського обліку й міжнародного досвіду. Потенційна можливість задоволення таких потреб різних соціальних груп безпосередньо залежить від обсягів та ефективності діяльності підприємства, що в цілому впливає: на загальні обсяги податків, внесків та інші обов'язкові платежів; поточні витрати підприємства; розмір*

прибутку, який може бути спрямований на реалізацію соціальних та інших потреб. Метою статті є дослідження методичних та організаційних аспектів аналізу витрат на персонал в системі управління підприємством. Використано інструментарій ABC-XYZ аналіз, побудова кривої Лоренца, Матриці інструментів управління персоналом задля визначення шляхів щодо оптимізації персоналу промислового підприємства, що сприятиме підвищенню ефективності діяльності підприємства в цілому. Впровадження пропозицій щодо ранжування працівників на основі ABC-XYZ аналізу дозволить суб'єктам господарювання в умовах кризових явищ оперативно реагувати на зміни її ринкового середовища в умовах невизначеності. Удосконалено методичний підхід до ранжування персоналу за групами (AX, AY, AZ, BX, BY, BZ, CX, CY, CZ) на основі використання кривої Лоренца та методу подвійної дотичної, що, на відміну від існуючих, уможливлює врахування критерій ефективності праці персоналу (продуктивності праці та стабільності роботи) з метою стратегічного розвитку промислового підприємства в цілому. На основі отриманих результатів дослідження розроблено рекомендації щодо управління працівниками промислового підприємства, особливо в частині заходів підвищення продуктивності праці та стабільності праці персоналу. Впровадження розглянутих пропозицій щодо ранжування персоналу підприємств дозволить побудувати базис для механізму забезпечення розвитку персоналу підприємств.

__Ключові слова:__ витрати на персонал, продуктивність праці, стабільність роботи, ABC-XYZ аналіз, лояльність, управління.

Problem setting. Perhaps, staff is the only resource that is constantly in hand, and not only in the turnover of the enterprise, but is changing in public life, while acquiring new unique properties, shifts in the structure of

components. Not only material and financial resources, but also internal factors of personality are required to maintain proper staff development.

Personnel development not only enables the company to successfully solve problems related to the emergence of new areas of activity, to ensure its competitiveness, but also has a positive impact on employees: improving skills and acquiring the latest abilities and knowledge, making them the most competitive in the labor market and receiving additional opportunities for professional growth within the enterprise.

The experience of economically developed countries of the world shows that investing in human capital, even in small amounts, allows you to obtain a much greater economic return in the long run than significant investments in the technical development of the enterprise. Investments in human capital are seen as a very important source of economic growth, more important than investments in physical capital.

The problem of investing in human capital is an issue for every business, especially in uncertainty. It is the appropriate tools for personnel analysis that will allow us to build an appropriate investment model for the cost of personnel of the enterprise in order to implement the mission of strategic development of the enterprise.

Analysis of recent research and publications. Personnel costs are a component of the enterprise's social costs.

The risk of the appearance of unexpected factors in the growth of the cost of programs of social importance gives reason to consider the main task of information resources accounting for social costs, aimed at meeting the needs of strategic management, the most accurate prediction of the factors of fluctuations in social costs, taking into account such factors during the formation of budgets and calculating the degree of their influence on the amount of costs [1-3].

Strategic information is subject to the general philosophy of management and involves the creation of simulation models of the behavior of social costs,

predicting their changes under the influence of selected cost management concepts: minimizing costs in the process of product design or gradually reducing social costs during the stages of the product life cycle through continuous improvement of individual types of enterprise activities [4-6]; determining the share of social costs at the stages of product value formation [7-9]; calculating the cost of external social initiatives [10].

In our opinion, as part of social expenses, it is necessary to allocate expenses for [11]: a social package regulated by legislation; personnel development; labor protection and safety equipment; motivation; maintenance of own objects of the social sphere; product quality assurance; warranty service; environmental costs (expenses for environmental protection, environmental payments); charitable assistance; participation in regional development programs, support of sports and cultural life of society.

Taxes should also be included among the elements of the social activity of the enterprise, since it is their payment that enables the state to implement social policy [12]. All of these costs have an impact on the natural environment, customers, the state, and the company's personnel, thereby determining the direction of social policy.

The formulation of the goals study of methodical and organizational aspects of personnel cost analysis in the enterprise management system.

Presentation of the main research material. Effective personnel management is impossible without analyzing the state of work, productivity, personnel costs. An effective tool for the microanalysis is the ABC analysis technique, which has a nearly 100-year history.

ABC analysis is based on the Pareto principle, confirms that 80% of the consequences are responsible for 20% of the reasons. However, practical experience shows, the 80/20 ratio can only be used as a base installation, as the process-specific relationships at a particular enterprise may be quite different. In addition, there are no clearly defined boundaries of groups in the economic

literature. Various scientists, when conducting ABC analysis, distinguish their own boundaries of groups for the division of employees into groups A, B and C. Of course, the process of personnel management is quite complicated.

The quality of the results of the analysis of the effectiveness of personnel management depends on a significant number of external and internal factors, and, accordingly, limited to only one, even quite accurate and reasonable method, it is impossible. In real-life systems such properties as: completeness, quality, functionality can be described not by one of the parameters, but by a certain combination of them.

In order to deepen the results of ABC analysis in the economic literature, it is quite often integrated with XYZ analysis, FMR analysis and other types of HRM analysis.

For the classification of the costs of remuneration according to the importance of conducting ABC-analysis. Stages of analysis: List the positions that will be analyzed (in our case, it is labor costs); Specify the value of each position; Sort the positions by decreasing the position value; Determine the cumulative percentage of each position (increasing totals); Assign each position to ABC group; Based on the obtained data, we draw conclusions.

The boundaries of the groups were determined using the double tangent method. The group is assigned on the basis of the following assumptions: group A – up to 85% of the total specific weight; group B – from 86% to 95% of the total specific weight; group C – from 96% to 100%.

The XYZ-analysis algorithm includes the following steps: determination of the object of analysis; selection of parameters by which the object will be evaluated; determination of the period by which the analysis will be carried out; estimation of the coefficient of variation and distribution of objects in groups; analysis of the results.

Considering the advantages and disadvantages of ABC and XYZ analyzes, it can be concluded that these methods are complementary. While

ABC analysis allows you to evaluate the contribution of each employee, XYZ analysis evaluates the constancy of the employee's work. Therefore, in the scientific literature, it is recommended to carry out a combination of ABC-XYZ analysis.

To ensure the effectiveness of personnel management, it is necessary to evaluate each employee according to certain criteria. To solve such tasks, ABC–XYZ analysis is used, with the help of which it is possible to analyze the structure, the level of labor productivity and determine the main directions of personnel costs for adjusting the personnel management policy. ABC-analysis is a tool that allows you to determine the rating among employees by the degree of influence on the total volume of production-labor productivity. Using this method in Microsoft Excel software, workers are divided into three groups.

According to the results of the ABC analysis of employees, the following ranking was made (Fig. 1). Group "A" includes workers who have the highest productivity. There are 13 employees in group "B", which requires constant control. Group "C" has the largest number of employees – 16.
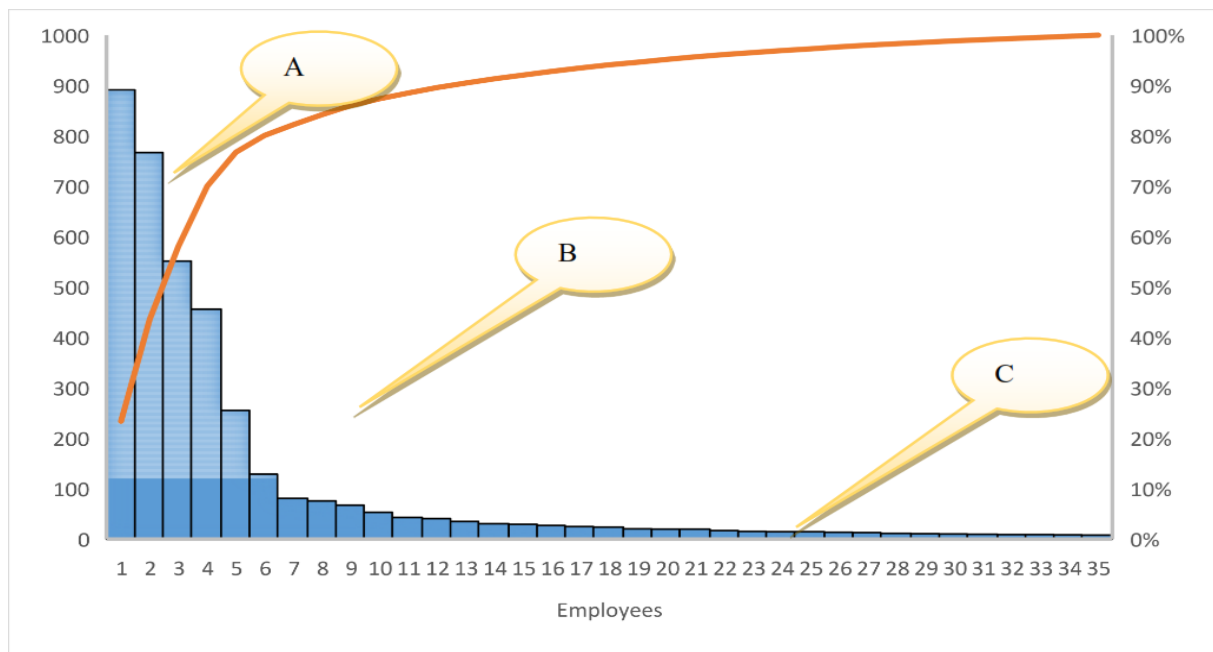

Fig. 1. Lorenz curve ranking of employees of PJSC "PROGRESS
Source: author's calculations

In order to obtain comprehensive information about employees, we will analyze the stability of work based on XYZ analysis. The basic idea of this analysis is to group objects according to the uniformity of the analyzed parameters, that is, the coefficient of variation. In this case, using the value of the coefficient of variation, workers are grouped by the indicator of stability - the average length of service of an employee in the enterprise. This calculation is carried out using Microsoft Excel for the four quarters of 2022.

After analyzing the stability of the work of employees for the four quarters of 2021, we can conclude that employees with the greatest experience in the enterprise (more than 10 years) are responsible for the group "X", they include 12 employees. These workers are leaders, because they provide the greatest amount of productivity and are characterized by stable relationships. Employees of this group can be considered as an object of strategic work. The next group "У" – is employees, work experience in the company from 5 years to 10 years. The main attention here should be paid to optimizing the level of productivity received from the employees of this group, with a minimum of total costs for the creation and support of personnel. According to the results of the analysis of the 35 analyzed employees include 13. The latter group includes all other employees with experience in the enterprise up to 5 years.

A graphical interpretation of the results of the integrated ABC - XYZ analysis of PJSC "PROGRESS" employees is presented in Fig. 2.
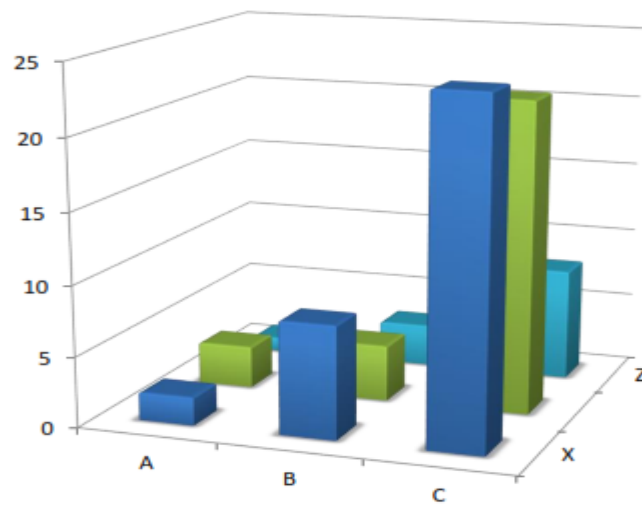
Fig. 2. Results of the combined ABC - XYZ analysis of employees at "PROGRESS PJSC"

Source: author's calculations

According to the results of the integrated ABC–XYZ analysis of the employees of PJSC "PROGRESS", the following conclusions can be drawn. Out of the analyzed number of employees, 17% provide 80% of the level of labor productivity, the other 37% of workers represent 15% of labor productivity.Part of the remaining workers, that is 46%, determines only 5% of labor productivity.

The final stage of the ABC–XYZ analysis is the construction of a matrix that enables appropriate management decisions to be made regarding the optimization of personnel costs depending on each category. Summarized results of the analysis are presented in Table 1.

Based on the obtained results, recommendations for the management of employees of the enterprise under study were developed.

According to groups AX, AY, BX and BY it is proposed to carry out a quarterly accounting of staff departures and maintain a stable operation, taking into account the projected value of staff costs in the future, because even the slightest deficit of these groups of workers can undermine the efficiency of the enterprise. At the same time, it is necessary to strive to avoid redundancy, because the demand for workers is stable and well predicted.

Table 1

Matrix of personnel management tools of PJSC "PROGRESS" based on the ABC-XYZ analysis

		X	Y	Z
Labor productivity of employees	A	1 The most significant, stable, management	1 The most significant are the low-management costs	2 Low-management costs are insignificant in value
	B	1 Stable, management costs with an average level of importance	3 Low-management costs with average level of significance	3 Difficult management costs with average significance
	C	3 Stable, management costs are insignificant in value	4 Low-management costs are insignificant in value	4 Difficult management costs are insignificant in value
Stability of employees' work				

Note: 1 – Stably perform their work, provide the largest volume of production; 2 – High productivity but unstable work; 3 – With an increase in the volume of production, the productivity of these workers decreases; 4 – Low productivity during the analyzed period

Source: author calculations

With high productivity, the BZ group has low job stability. This may encourage the management to try to ensure that all employees of the group are in the warehouse by creating an excess employee reserve. However, it can cause an artificial increase in the company's employees, which will lead to higher costs and a freeze. Therefore, the employees of this group should analyze the current system of motivation. For employees, it makes sense to use a bonus system and other material incentives. For the second part of the employees it is advisable to provide a higher level of teamwork and increase the frequency of control.

The expediency of the presence of employees forming the CZ group should be carefully reviewed. They have low productivity and do not bring tangible profits to the enterprise. Employees who are in the CY and CZ groups are characterized by low productivity during the analyzed period. Given the

analysis, it can be concluded that the further development of these workers will not lead to positive results, therefore they should be eliminated.

Conclusions. Based on the implementation of the integrated ABC–XYZ analysis of industrial enterprise personnel, which allows to structure the enterprise personnel into groups based on their contribution to production and profit of the enterprise, as well as the possibility of forecasting their costs in future periods, recommendations on optimization of personnel of the investigated enterprise and management are developed, which will improve the efficiency of the enterprise as a whole.

Application of this methodical approach allows to carry out optimum formation of employees of the enterprise, provides rhythm of production process and increases profitability of the industrial enterprise. The implementation of the considered proposals for the ranking of employees will create a basis for improving the mechanism of personnel management, the ability of business entities in the conditions of crisis better to ensure stable and progressive development, to respond quickly to changes in its market environment, to determine measures to improve the efficiency of the enterprise.

The prospects for further research are the development of enterprise development strategies matrix of personnel management tools based on ABC–XYZ analysis, the development of appropriate recommendations for the professional development of each group of employees, measures to ensure the stability of employees, in particular, the adjustment of the incentive mechanism.

References

1. Feng L., Sass T.R. The impact of incentives to recruit and retain teachers in "hard-to-staff" subjects. *Journal of Policy Analysis and Management.* 2018. № 37(1). P. 112–135. URL: https://onlinelibrary.wiley.com/doi/abs/10.1002/pam.22037 (date of access: 15.10.2023).

2. Hong J.Y., Chae J., Song M.R., Kim E.M. A utilization strategy of nursing staff by types of medical institutions-nurse staffing level of medium and small-sized hospitals. *Journal of the Korea Academia-Industrial Cooperation Society.* 2017. № 18(8). P. 162–170. URL: http://www.koreascience.or.kr/article/JAKO201726163272525.page (date of access: 15.10.2023).

3. Iden J., Bygstad B. The social interaction of developers and IT operations staff in software development projects. *International Journal of Project Management.* 2018. № 36(3). P. 485–497. URL: https://www.sciencedirect.com/science/article/abs/pii/S0263786317305367 (date of access: 15.10.2023).

4. Marie J., MacKenzie S., Rowett S., Wright M. Staff Perceptions of 'hard to reach'. *Journal of Educational Innovation Partnership and Change.* 2017. № 3(1). URL: https://discovery.ucl.ac.uk/id/eprint/10065193/ (date of access: 15.10.2023).

5. Masood M., Afsar B. Transformational leadership and innovative work behavior among nursing staff. *Nursing inquiry.* 2017. № 24(4). 12188. URL: https://onlinelibrary.wiley.com/doi/abs/10.1111/nin.12188 (date of access: 15.10.2023).

6. McCabe C., McCann M., Brady A.M. Computer and mobile technology interventions for self-management in chronic obstructive pulmonary disease. *Cochrane Database of Systematic Reviews.* 2017. № 5. URL: https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD011425.pub2/abstract (date of access: 15.10.2023).

7. Morsiani G., Bagnasco A., Sasso L. How staff nurses perceive the impact of nurse managers' leadership style in terms of job satisfaction: a mixed method study. *Journal of nursing management.* 2017. № 25(2). P. 119–128. URL: https://onlinelibrary.wiley.com/doi/abs/10.1111/jonm.12448 (date of access: 15.10.2023).

8. Neri S., Wilkins S. Talent management in transnational higher education: strategies for managing academic staff at international branch campuses. *Journal of Higher Education Policy and Management.* 2019. № 41(1). P. 52–69. URL: https://www.tandfonline.com/doi/abs/10.1080/1360080X.2018.1522713 (date of access: 15.10.2023).

9. Rahman M.S., Daud N.M., Raman M. Knowledge sharing behaviour among non-academic staff in higher learning institutes: The role of trust and perceived risk. *Knowledge Management & E-Learning: An International Journal.* 2018. № 10(1). P. 113–124. URL: http://www.kmel-journal.org/ojs/index.php/online-publication/article/view/31 (date of access: 15.10.2023).

10. Thompson-Lastad A., Yen I.H., Fleming M.D., Van Natta M., Rubin S., Shim J.K., Burke N.J. Defining trauma in complex care management: safety-net providers' perspectives on structural vulnerability and time. *Social Science & Medicine.* 2017. № 186. P. 104–112. URL: https://www.sciencedirect.com/science/article/abs/pii/S0277953617303635 (date of access: 15.10.2023).

11. Van Staden E. High staff turnover-can it be reduced?. *Professional Nursing Today.* 2017. № 21(4). P. 54–56. URL: https://journals.co.za/content/journal/10520/EJC-c4d1d5b45 (date of access: 15.10.2023).

12. Wright K.L., Verney K., Brennan D., Lindsay D., Lindsay D., & Smyth W. Administrative staff self-reported long-term conditions. *International Journal of Workplace Health Management.* 2019. URL: https://www.emerald.com/insight/content/doi/10.1108/IJWHM-01-2019-0007/full/html (date of access: 15.10.2023).