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## **HIERARCHICAL CLASSIFICATION OF FACTORS INFLUENCING THE PERSONNEL MANAGEMENT SYSTEM OF AN INDUSTRIAL ENTERPRISE**

*In modern conditions, human resources are one of the most important elements in the enterprise. In order for the company to be effective, it is necessary to pay considerable attention to personnel management.*

*The purpose of the article is to form a set and hierarchical classifications of factors influencing the personnel management system.*

*The article proposes hierarchical relationships of factors influencing the personnel management system, which, in contrast to existing approaches, allows to take more fully into account the factors that determine the effectiveness of personnel management and to form a mathematical model of intellectual decision support for personnel management. The linguistic variable that corresponds to the indicator of the effectiveness of personnel management is presented as a function of the components that describe the influence of factors of the personnel management system; the influence of internal and external factors on personnel management.*

*The practical significance of the results is that the theoretical and methodological provisions of scientific work are brought to the level of specific practical recommendations for the formation of a personnel management system and can be used by enterprises to make management decisions to improve business results in their relationship and interdependence.*

**Keywords:** *human resources, personnel management, linguistic variables, motivation*

Tabl. – 1, Ref. – 15.

**Problem definition.** Human resources are one of the most important elements in the enterprise. For the successful operation of any company, regardless of the services they provide and the goods they produce, the company needs an efficient working team. In order for the company to be effective, it is necessary to pay considerable attention to personnel management. Unfortunately, a significant number of companies underestimate the importance of human resources and use outdated methods of personnel management, but the use of new approaches in personnel management can be crucial to improve the efficiency of the enterprise.

It is a well-known fact that persistence in achieving goals is formed in employees only in the presence of strong motivating factors. With low motivation, the work is not done in order to receive a reward, but only to avoid punishment. Thus, the implementation of new qualitative and quantitative positive changes in the development of the enterprise requires appropriate motivation of employees, the creation of a set of motivators and disciplinary processes to achieve this goal. That is why it is very important to form an effective process of staff motivation.

**Review recent research and publications,** Erks and Dodson (researchers of people's motivation) proved that the best productivity occurs at average motivation, but in their research, they used the motivation of coercion, which does not allow to extend their conclusions to all possible cases of motivation [1].

Influence on humans through their needs was considered by Maslow [2], Alderfer [3], McClelland [4] and others ([5-9]). Maslow A. developed a hierarchy of human needs and presented it in the form of a pyramid based on basic physiological needs, the need to be safe and loving [2]. The top of the pyramid is the need for self-actualization and aesthetics. McClelland D. considers human needs at higher levels, he proposes to divide all human needs into the need for achievement, complicity and power [4].

Goepel M., Hölzle K., Knyphausen-Aufseß D. the peculiarities of the formation of motivation of employees of enterprises are investigated [10]. Voynarenko, M. P., Dzhedzhula, V. V., Yepifanova, I. Yu. simulated the process of staff motivation [8]. The approach proposed an anonymous survey of employees to determine the overall level of motivation of employees and ways to improve it depending on the level of individual components - the functions of desirability. First of all, efforts should be directed to the implementation of cost-effective and low-cost measures to increase motivation and after the implementation of these areas to make a change in the material support of employees.

In the scientific work, to implement the process of modeling staff motivation to innovate, a universal indicator is used - the Harrington desirability function [11].

**Definition of objectives.** The purpose of the article is to form a set of hierarchical classifications of factors influencing the personnel management system.

The following general and special methods were used in the research: abstract-logical and structural-logical analysis - to make theoretical generalizations and clarify the definition of "personnel management", the method of formalizing the factors of influence - to identify factors influencing the personnel management system; tabular method.

### **Results and discussion**

The personnel management system is influenced by various factors, including internal, external and specific factors of the personnel management system. Effective performance of any company closely connected with personnel management.

Personnel management is the science and art of effective management of people in the conditions of their professional activity. This is a system of principles, methods and mechanisms for optimal combination, development and motivation, as well as the rational use of staff [5].

The personnel management system, which is aimed at achieving strategic goals and obtaining high performance indicators in the Enterprise, is a fundamental basis for achieving high economic performance. For the successful development of the Enterprise it is very important to form a creative, professional team taking into account the individual characteristics of all employees. It is also important to form a favorable moral and psychological climate. The state of the socio-psychological climate, the degree of its impact on the individual can be considered as one of the essential indicators of the effectiveness of the leader. It is also necessary to take into account the temperament of employees when creating working groups, teams, delegating authority and distribution of work tasks. It is necessary to create comfortable working conditions for each person, which will promote more efficient work of each employee [12].

For effective operation, the personnel management system must use optimal innovative techniques and technologies. Personnel management technologies that are most open to the perception of innovation are grouped into the following blocks [9]:

- personnel planning subsystem,
- personnel development subsystem,
- subsystem of stimulation and motivation of personnel,
- subsystem of organization of innovative activity of personnel.

The management of each company understands that the effectiveness of activities depends on the qualifications of employees. Internal training at the enterprise does not always solve the problem, especially if specialists are needed at the moment.

Therefore, it is necessary to use staff from the external environment, entering the labor market. The subjects of the labor market are employees as owners, carriers and sellers of goods "labor" and employers as buyers. The object of the labor market is labor, which is a commodity and is bought and sold, like all other goods. The labor market by its economic purpose is a market of factors of production, i.e. the demand for resources is formed by firms that consume certain resources, and supply is formed by households - as owners of these resources. Like any other market, the labor market needs some government regulation.

It can be concluded that the personnel management system is a very important element of any enterprise, it significantly affects the efficiency of its activities. Human resources are extremely valuable, because the quality of products and services provided by the company depends on the qualifications of employees. In modern conditions, the value of human resources is increasing, and therefore the need for competent management of these resources is growing. That is why personnel management is one of the most important systems that affect the efficiency of the enterprise.

The recruitment system significantly affects the personnel management system, because depending on the type of recruitment there will be different processes of adaptation of the employee, there will be different cost and time to close the vacancy.

The moral and psychological climate in the team can increase or decrease the productivity of employees. One of the directions that helps to create a favorable psychological climate is the organization of people into production teams on the basis of their psychological compatibility, which means psychological closeness of partners, mutual sympathy, similarity of their characters, common interests and inclinations.

Development and training systems play an important role in the personnel management system. Today, every company needs retraining of technical staff, training of new employees, training of employees on how to do their job better. The Personnel training policy should be aimed at ensuring the rights of workers to higher and vocational education in accordance with

their interests, vocations, abilities and meet the needs of all areas of economic activity in skilled and competitive workers in the labor market [13].

Personal qualities of employees are also an important component of the personnel management system, because it depends on them whether a potential employee will fit into the team, whether it will create conflict situations, or will share corporate values. The professional qualities of the employee affect the quality of work performed and the needs of future professional training.

The system of motivation is an important element of personnel management and plays a significant role in productivity and achievement of enterprise results. Skillful use of motivation helps managers to develop ways to achieve maximum results of work of subordinates on the basis of a clear idea of the peculiarities of their behavior. The behavior of people in the process of activity is increasingly influenced by labor motivation, which is generated by labor itself, its content, conditions, organization of the labor process, mode of work and so on. Everyone needs meaningful, interesting, useful work, decent working conditions. The person seeks to determine the prospects for its growth [14].

Willingness to innovate determines the ability of employees to adapt to new conditions and this feature is very important, because in modern conditions, companies need to constantly implement innovation processes to remain competitive.

The financial and economic condition of the enterprise significantly affects the personnel management system, because the effective implementation of new measures requires funds that the company in a state of crisis will not be able to spend on a personnel management system. At the same time, a profitable company has the opportunity to spend more on motivation and staff training, thereby increasing its efficiency.

Working conditions are an important element of the personnel management system. If working conditions do not meet the standards, workers less motivated to work effectively. The better the working conditions, the more motivated and productive the employees are likely to be.

The corporate culture of the company is formed on the basis of its technical development, principles of doing business, traditions, qualifications of workers, clearly defined procedures for the implementation of labor processes, work atmosphere, beliefs, etc. [15]. If the corporate culture in the enterprise is strong and true and the employees will correspond to it, then all employees will be part of one whole and it will significantly affect the efficiency of the whole enterprise. If there is no corporate culture or it exists only "on paper", employees will be separated and unmotivated, which will negatively affect the results of their activities.

Social infrastructure is not a direct element of the personnel management system, but has a significant impact on employee motivation and job satisfaction. The better developed the social infrastructure, the more necessary and protected the employee feels, which will have a positive effect on their efficiency.

The degree of mechanization of labor makes it possible to save on manual labor, making processes faster and better, thus allowing the use of savings for enterprise development. Low mechanization of labor processes is more resource-intensive and less efficient.

The level and quality of education significantly affect the effectiveness of the personnel management system, because the higher the level and quality of education, the more qualified personnel will come to the company and the less it will be necessary to spend on their training and retraining.

The situation on the labor market has a significant impact on the effectiveness of the personnel management system. If there are no potential candidates in the market, the company will suffer from a shortage of employees and will have to spend significant funds on training

existing employees or significantly increase the salaries of new employees to attract them to the company. Excess labor in the market also leads to negative consequences.

Personnel policy of other enterprises can also affect the labor market and the personnel management system of a particular enterprise. If a competitor offers a higher wage and social package, it will be necessary to pursue the same policies that lead to new losses in order to attract new employees and keep existing ones.

Based on the above information, there is a need to form a mathematical model in the formation of intellectual support for decision making. To do this, taking into account the sources, hierarchical relationships of factors influencing the personnel management system are formed, which are shown in Table 1. The decision-making process using fuzzy logic theory and linguistic variable is based on a system of fuzzy inference - approximation of the dependence  $Ff = f(x_1, x_2, y_1, z_1 \dots z_n)$  using fuzzy rules and fuzzy logical operations of addition, union, intersection and implications. As a result of modeling the indicator of efficiency of personnel management which will allow to choose among alternatives optimum strategy of personnel management is chosen. The linguistic variable that corresponds to the indicator of the effectiveness of personnel management  $Fe$  is presented as a function of the components:

$$Fe = f(X, Y, Z), \quad (1)$$

where  $X$  is a linguistic variable (LV), which describes the influence of factors of the personnel management system;

$Y$  - LV that describe the impact of internal factors on personnel management;

$Z$  is a LV that describes the influence of external factors.

The linguistic variable that describes the influence of factors of the personnel management system can be represented as a dependence:

$$X = f(x_1, x_2, x_3, x_4, x_5, x_6), \quad (2)$$

where  $x_1$  - LV "recruitment system";

$x_2$  - LV "moral and psychological climate in the team";

$x_3$  - LV "development and training systems";

$x_4$  - LV "personal and professional qualities of employees";

$x_5$  - LV s "motivation system";

$x_6$  - LV "Willingness to innovate".

The linguistic variable that characterizes the impact on the process of personnel management of internal factors is presented as a dependence:

$$Y = f(y_1, y_2, y_3, y_4, y_5), \quad (3)$$

where  $y_1$  - LV "financial and economic condition";

$y_2$  - LV "working conditions";

$y_3$  - LV "corporate culture";

$y_4$  - LV "social infrastructure";

$y_5$  - LV "degree of mechanization of labor".

Linguistic variable describing the influence of external factors on the process of personnel management is presented in the form of dependence:

$$Z = f(z_1, z_2, z_3), \quad (3)$$

where  $z_1$  - LV "level and quality of education";

$z_2$  - LV "situation on the labor market";

$z_3$  - LV "personnel policy of other enterprises".

**Table 1.** Factors influencing the personnel management system as linguistic variables

Parameter	Designation and name of the variable	Universal set	Linguistic terms for evaluation
Factors of the personnel management system	x <sub>1</sub> Recruitment system	U(x <sub>1</sub> =[1...5]) (points)	Internal recruitment, external recruitment
	x <sub>2</sub> Moral and psychological climate in the team	U(x <sub>2</sub> =[1...5]) (points)	Favorable, neutral, unfavorable
	x <sub>3</sub> Development and training systems	U(x <sub>3</sub> =[1...5]) (points)	Traditional, innovative, absent
	x <sub>4</sub> Personal and professional qualities of employees	U(x <sub>4</sub> =[1...5]) (points)	Match the position, do not match the position
	x <sub>5</sub> Motivation system	U(x <sub>5</sub> =[1...5]) (points)	Effective, ineffective
	x <sub>6</sub> Willingness to innovate	U(x <sub>6</sub> =[1...5]) (points)	High, medium, low
Internal factors	y <sub>1</sub> Financial and economic condition	U(y <sub>1</sub> =[1...5]) (points)	Profitable, unprofitable, on the verge of bankruptcy
	y <sub>2</sub> Working conditions	U(y <sub>2</sub> =[1...5]) (points)	Very high, meet standards, do not meet standards
	y <sub>3</sub> Corporate culture	U(y <sub>3</sub> =[1...5]) (points)	Real, exists only "on paper"
	y <sub>4</sub> Social infrastructure	U(y <sub>4</sub> =[1...5]) (points)	Very developed, developed, not developed
	y <sub>5</sub> The level of labor mechanization	U(y <sub>5</sub> =[1...5]) (points)	High, medium, low
External factors	z <sub>1</sub> Level and quality of education	U(z <sub>1</sub> =[1...5]) (points)	High, medium, low
	z <sub>2</sub> Situation on the labor market	U(z <sub>2</sub> =[1...5]) (points)	There are many / average number / not enough potential employees
	z <sub>3</sub> Personnel policy of other enterprises	U(z <sub>3</sub> =[1...5]) (points)	Better than the existing one at the enterprise, the same, worse

*Source: built by authors*

On the basis of the formed factors of influence the mathematical model of intellectual support of decision-making on the basis of the theory of fuzzy logic and a linguistic variable is constructed. For the developed mathematical model, the form of membership functions is Gaussian. This form of membership function is the most flexible, universal and allows to describe the degree of ownership of most of the processes under consideration.

**Conclusions.** It is proposed hierarchical relationships of factors influencing the personnel management system, which, in contrast to existing approaches, allows to take more fully into account the factors that determine the effectiveness of personnel management and to form a mathematical model of intellectual decision support for personnel management. The linguistic variable that corresponds to the indicator of the effectiveness of personnel management is presented as a function of the components that describe the influence of factors of the personnel management system; the influence of internal and external factors on personnel management.

The practical significance of the results is that the theoretical and methodological provisions of scientific work are brought to the level of specific practical recommendations for the formation of a personnel management system and can be used by enterprises to make management decisions to improve business results in their relationship and interdependence.

## REFERENCES

1. Yerkes, R. M., Dodson, J. D. (1980). The Relation of Strength of Stimulus to Rapidity of Habit-Formation". *Journal of Comparative Neurology and Psychology*, 18, 459-482. <https://doi.org/10.1002/cne.920180503>. [in English].
2. Maslow, A. H. (1987). *Motivation and Personality*. Addison-Wesley Educational Publishers Inc. [in English].
3. Alderfer, C. (1972). *Existence, Relatedness and Growth*. New York: Free Press. [in English].
4. McClelland, D. C. (1987). *Human motivation*. Cambridge University Press. [in English].
5. Masaaki, I. (1986). *Kaizen: The Key To Japan's Competitive Success*. McGraw-Hill Education. [in English].
6. McGregor, D. (1960). *The Human Side of Enterprise*. New York: McGraw-Hill. [in English].
7. Zahirniak M. V., Pererva P. H., Maslan O. I. (2015). *Upravlinnia personalom: sut, zavdannia, osnovni pryntsyty*. *Ekonomika pidpriumstva* Ch.1. [in Ukrainian].
8. Voynarenko, M. P., Dzhedzhula, V. V., Yepifanova, I. Yu. (2016). Modelling the process of making decisions on sources of financing of innovation activity. *Economic Annals-XXI*, 160 (7-8), 126-129. [in Ukrainian].
9. Vediernikov, M. D., Bazaliiska, N. P. (2018). Innovatsiini tekhnolohii upravlinnia personalom promyslovoho pidpriumstva. *Ekonomika ta pidpriumnytstvo*, №3, 72–78. [in Ukrainian].
10. Goepel, M., Hölzle, K., Knyphausen-Aufseß, D. (2012). Individuals' innovation response behaviour: a framework of antecedents and opportunities for future research, *Creativity and Innovation Management*, Vol. 21, No. 4, 2012, 412–426. <https://doi.org/10.1111/caim.12000> [in English].
11. Voynarenko, M., Dzhedzhula, V., Yepifanova, I. (2020). Modeling of the process of personnel motivation for innovation activity *WSEAS Transactions on Business and Economics*, 17, 467-477. doi: 10.37394/23207.2020.17.45. [in English].
12. Yepifanova, I. Yu, Pankova, V. V. (2021). Udoskonalennia systemy motyvatsii personalu promyslovykh pidpriumstv Ukrainy. *Ekonomika ta suspilstvo*, №23. <https://doi.org/10.32782/2524-0072/2021-23-6>. [in Ukrainian].
13. Pankratova, O. M. (2021). Pidvyshchennia kvalifikatsii personalu v suchasnykh umovakh ta rozvytok tendentsii korporatyvnykh osvitynykh protsesiv. *Economy and society*. Vol. 25. URL: <https://economyandsociety.in.ua/index.php/journal/article/view/232/222>. [in Ukrainian].
14. Kuchynskiy V. A., Bekimbetova, I. V. (2021). Motyvatsiia ta yii efektyvnist v upravlinni personalom pidpriumstva. *Informatsiini tekhnolohii: nauka, tekhnika, tekhnolohiia, osvita, zdorovia*. Vol. III. URL: [http://repository.kpi.kharkov.ua/bitstream/KhPI-Press/53001/4/MicroCAD\\_2021\\_Kuchynskiy\\_Motivaciya\\_ta\\_ii\\_efektuvnist.pdf](http://repository.kpi.kharkov.ua/bitstream/KhPI-Press/53001/4/MicroCAD_2021_Kuchynskiy_Motivaciya_ta_ii_efektuvnist.pdf) [in Ukrainian].
15. Lozova T. I., Oliinyk, H. Yu., Kadatska, T. O. (2021). Korporatyvna kultura u systemi realizatsii marketynhovoї stratehii pidpriumstva. *Ekonomika ta derzhava*, №1, 10–16. [in Ukrainian].

**Спіфанова І., Джеджула В., Панкова В.**

### **ІЄРАРХІЧНА КЛАСИФІКАЦІЯ ФАКТОРІВ ВПЛИВУ НА СИСТЕМУ УПРАВЛІННЯ ПЕРСОНАЛОМ ПРОМИСЛОВОГО ПІДПРИЄМСТВА**

*В сучасних умовах людські ресурси є одним з найважливіших елементів в діяльності підприємства. Для того, щоб підприємство було ефективним, необхідно приділяти значну увагу управлінню персоналом.*

*Метою статті є формування сукупності та ієрархічна класифікація факторів впливу на систему управління персоналом.*

*В роботі запропоновані ієрархічні зв'язки факторів впливу на систему управління персоналом, що на відміну від існуючих підходів, дозволяє більш повно врахувати фактори, які визначають ефективність управління персоналом і сформувати математичну модель інтелектуальної підтримки прийняття рішень з управління персоналом. Лінгвістичну змінну, що відповідає показнику ефективності управління персоналом представлено у вигляді функції від складових, що описують вплив факторів системи управління персоналом; вплив внутрішніх факторів на управління персоналом; вплив зовнішніх факторів. Практичне значення одержаних результатів полягає в тому, що теоретичні та методичні положення наукової роботи доведені до рівня конкретних практичних рекомендацій з формування системи управління персоналом та можуть використовуватись промисловими підприємствами для ухвалення управлінських рішень з покращення результатів господарської діяльності у їх взаємозв'язку та взаємообумовленості.*

**Ключові слова:** людські ресурси, управління персоналом, лінгвістичні змінні, мотивація

**Епифанова И., Джеджула В., Панкова В.**

### **ИЄРАРХИЧЕСКАЯ КЛАССИФИКАЦИЯ ФАКТОРОВ ВЛИЯНИЯ НА СИСТЕМУ УПРАВЛЕНИЯ ПЕРСОНАЛОМ ПРОМЫШЛЕННОГО ПРЕДПРИЯТИЯ**

*В современных условиях человеческие ресурсы являются одним из важнейших элементов в деятельности предприятия. Для того, чтобы предприятие было эффективным, необходимо уделять особое внимание управлению персоналом.*

*Целью статьи является формирование совокупности и иерархическая классификация факторов влияния на систему управления персоналом.*

*В работе предложены иерархические связи факторов влияния на систему управления персоналом, что в отличие от существующих подходов, позволяет более полно учесть факторы, определяющие эффективность управления персоналом и сформировать математическую модель интеллектуальной поддержки принятия решений по управлению персоналом. Лингвистическую переменную, что соответствует показателю эффективности управления персоналом представлено в виде функции от составляющих, описывающих влияние факторов системы управления персоналом; влияние внутренних факторов на управление персоналом; влияние внешних факторов.*

*Практическое значение полученных результатов заключается в том, что теоретические и методические положения научной работы доведены до уровня конкретных практических рекомендаций по формированию системы управления персоналом и могут использоваться промышленными предприятиями для принятия управленческих решений по улучшению результатов хозяйственной деятельности в их взаимосвязи и взаимообусловленности.*

**Ключевые слова:** человеческие ресурсы, управление персоналом, лингвистические переменные, мотивация