“Diagnostics of the enterprise personnel sustainability”

AUTHORS	Iryna Trunina https://orcid.org/0000-0002-7416-1830 http://www.researcherid.com/rid/AAF-5568-2019 Denys Zagirniak https://orcid.org/0000-0002-7009-8635 http://www.researcherid.com/rid/H-6452-2018 Kateryna Pryakhina https://orcid.org/0000-0002-5747-9492 http://www.researcherid.com/rid/N-5380-2019 Tetyana Bezugla https://orcid.org/0000-0003-1567-7332

ARTICLE INFO	Iryna Trunina, Denys Zagirniak, Kateryna Pryakhina and Tetyana Bezugla (2020). Diagnostics of the enterprise personnel sustainability. *Problems and Perspectives in Management*, *18*(2), 382-395. doi:10.21511/ppm.18(2).2020.31
DOI	http://dx.doi.org/10.21511/ppm.18(2).2020.31
RELEASED ON	Wednesday, 01 July 2020
RECEIVED ON	Sunday, 19 April 2020
ACCEPTED ON	Tuesday, 16 June 2020

LICENSE	This work is licensed under a Creative Commons Attribution 4.0 International License

JOURNAL	"Problems and Perspectives in Management"
ISSN PRINT	1727-7051
ISSN ONLINE	1810-5467
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
26	2	8

© The author(s) 2025. This publication is an open access article.

BUSINESS PERSPECTIVES

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine

www.businessperspectives.org

Iryna Trunina (Ukraine), **Denys Zagirniak** (Ukraine),
Kateryna Pryakhina (Ukraine), **Tetyana Bezugla** (Ukraine)

DIAGNOSTICS OF THE ENTERPRISE PERSONNEL SUSTAINABILITY

Abstract

Ensuring Ukrainian enterprises' personnel sustainability is a real challenge because the structural transformation of the labor market in the context of globalization of the world economy leads to increased competition for qualified personnel. In the Ukrainian labor market, the tendency to imbalance professional and qualification structure is the result of the progress of migration, urbanization, and demographic crisis. Thus, the study aims to develop a procedure for diagnostics and predicting the personnel sustainability of the enterprises due to the construction of the forecast model. The formation of "Predictable Model of the Personnel Sustainability" ("PMPS"), which is based on an analysis of the personnel sustainability indicators and predictors of release, was proposed. Approbation was carried out on the example of the Ukrainian enterprises of a recreational complex. The results of the personnel sustainability forecasting showed that the extent of the violation of the personnel sustainability is significant because the high projected performance of the indicators of fluctuation movement of the personnel and employee turnover changes, the structural components associated with wages indicate its further growth, and trends in the predictors of the violation of sustainability signal the possible dismissal of the personnel in the future.

Keywords management, Human Resource Management (HRM), personnel, staff, diagnostics, predictors, Ukraine

JEL Classification M12, M54

Received on: 19th of April, 2020
Accepted on: 16th of June, 2020
Published on: 1st of July, 2020

© Iryna Trunina,
Denys Zagirniak, Kateryna Pryakhina,
Tetyana Bezugla, 2020

Iryna Trunina, Doctor of Economics, Professor, Head, Business Administration, Marketing and Tourism Department, Kremenchuk Mykhailo Ostrohradskyi National University, Ukraine.

Denys Zagirniak, Doctor of Economics, Professor, Accounting and Finance Department, Kremenchuk Mykhailo Ostrohradskyi National University, Ukraine.

Kateryna Pryakhina, Ph.D. in Economics, Senior Lecturer, Business Administration, Marketing and Tourism Department, Kremenchuk Mykhailo Ostrohradskyi National University, Ukraine. (Corresponding author)

Tetyana Bezugla, Ph.D. in Economics, Assistant Lecturer, Business Administration, Marketing and Tourism Department, Kremenchuk Mykhailo Ostrohradskyi National University, Ukraine.

This is an Open Access article, distributed under the terms of the Creative Commons Attribution 4.0 International license, which permits unrestricted re-use, distribution, and reproduction in any medium, provided the original work is properly cited.

Conflict of interest statement:
Author(s) reported no conflict of interest

INTRODUCTION

Transformational changes that are characteristic of the domestic labor market are in line with modern globalization trends and transformations of the global labor market. These trends are a consequence of the progress of migration, urbanization, and demographic crisis, which leads to aging staff and a deficit of qualified personnel. However, providing enterprises with personnel is a prerequisite for personnel sustainability. Thus, providing the personnel sustainability of domestic enterprises needs research. Traditionally, personnel sustainability is defined as a certain state of the personnel management system characterized by quantitative indicators. However, one of the most difficult tasks of ensuring the personnel sustainability and preventing its violation is not only identifying the actual quantitative and qualitative characteristics of the personnel sustainability but also identifying the causes and factors that may determine the employee's intention to resign. This will help control the personnel's fluctuation movement using certain technologies of personnel marketing. Under these conditions, the formation and approbation of the procedure of diagnostics of the enterprise personnel sustainability are one of the most relevant problems.

The recreational sphere is one of the priority spheres of development in Ukraine because it can, directly and indirectly, influence the socio-

http://dx.doi.org/10.21511/ppm.18(2).2020.31

economic development of the region. The recreational complex unites a system of recreational facilities that serve enterprises of infrastructure and other industries, which have close industrial and economic ties and share resources to meet various health, cognitive, cultural, and other needs. It is a complex institutional socio-economic and material formation and the main system-forming factor, which is the provision of human life through the implementation of prevention, treatment, rehabilitation, and recreation. The result is the creation and consumption of a specific recreational product. Therefore, the enterprises of the recreational complex need an audit of the conditions of personnel development at the enterprises, as a result of which it is possible to conclude the competitiveness of such conditions, and hence the ability to ensure personnel sustainability. Therefore, the proposed procedure for diagnostics of the personnel sustainability is tested in this area.

1. LITERATURE REVIEW

The scientists use the concept of "sustainability" in various fields of science: biology, economics, mathematics, mechanics, psychology, sociology, engineering, physics, chemistry, related to the study and operation of complex systems. For the first time, the term "economic sustainability" appeared within the study of the problem of limited resources, which was a consequence of global energy crises, and later this direction of economic thought became a separate discipline called "Ecosestate (economic security of state)", which means "economic sustainability of the state". Khrystynko and Butkova (2011) considered sustainable economic development, mainly at the level of the country or region. One of the elements of economic sustainability of the enterprise is the personnel sustainability, the value of which is that the level of qualification and competence of employees determines the enterprise competitiveness in the labor market; therefore, determines its ability to attract staff on time, to form a team with the necessary characteristics for the enterprise, to update the staff. Despite the urgency of the problem, during the study, it was found that the problem of personnel sustainability is insufficiently studied.

The concept of "personnel sustainability" entered the Ukrainian sociology of labor in the mid-80's of the last century. Thus, Panyukov (1976) considered the personnel sustainability as the "property (ability) of the production team to maintain and develop their socio-production potential under the conditions of personnel dynamics (reduction, change, development, turnover, promotion, etc.). For example, the concept of "personnel sustainability" is considered in the book of Lukashevich (2004) "Sociology of Labor" concerning the concepts of "turnover" and "sustainability" in the context of sociological research. A high level of personnel sustainability is an equally important result of the enterprise and the product, profit, or reputation. Employees of successful companies are a full-fledged group of influence, the same as clients, shareholders, or investors. Currently, only those companies that can provide employment for the current attractiveness of potential employees will be the most competitive in the long run (Lenskaya, 2016). Kuzniarska (2018) also proposes the sustainability concept and points out the role of sustainable human resources management in creating sustainable enterprises.

Whitman (2004) argues that personnel sustainability is "a set of attitudes of the employee regarding his further stay in the company". Commitment to the organization, readiness to return to it after a break, and readiness for long-term cooperation are considered key elements of sustainability. Alferova (2012) considers the personnel sustainability as a condition due to a set of attitudes of the employee regarding his stable and effective further stay in the company, and the stabilization of personnel in the organization as a "process due to various factors and actions of the company". Vartanova (2019) connects the personnel sustainability with its competitiveness and proposes considering personnel qualifications and competencies through the lens of personnel qualifications and competencies. This connection is well-founded because qualified personnel, whose competencies are growing, are competitive in the labor market, which allows the company to form a sustainable and stable team that can perform the given tasks.

Zakharova (2016) and Lukashevych (2004) determine the indicators that allow assessing person-

nel sustainability and identify measures to form sustainability. Zelinska (2017) proposed the indicators for assessing personnel sustainability for oil and gas enterprises. Pochtovyuk and Pryakhina (2020) propose to ensure the personnel sustainability of machine-building enterprises through professional and qualification compliance of the employee professional qualities to the needs of the employer. The main predictors of personnel sustainability determine a stable salary (Veerasamy, Loch, Adam, Howe, & Brunton, 2018). Zijlstra and Broadhead (2007) noted that wages is a factor in personnel sustainability. Therefore, personnel sustainability should be considered to achieve a certain state of personnel sustainability according to the established criteria for achieving stability. It should be considered not so much as a process but as a state of the object of study, which is characterized by certain quantitative and qualitative parameters.

Andrunik, Ostapenko, and Kosykyn (2016) study personnel sustainability in terms of diagnostics when recruiting them. The paper considers the applicability of diagnostic indicators of personnel competencies in self-developing, self-organizing systems to solve candidates' optimal selection problems. The structuring of personnel characteristics allows developing a model of key competencies using the software with the built-in procedure that combines the competence model, active examination, cluster analysis, and logit modeling by artificial intelligence. Makedon, Hetman, Yemchuk, Paranytsia, and Petrovska (2019) have a similar position, proposing a functional and structural approach for ensuring the personnel sustainability that includes the following functions: analysis and planning of personnel, recruitment, and selection of personnel, attestation, and evaluation of personnel, organization of labor relations, motivational support, creation of working conditions, information provision, development and training of personnel.

Foreign researchers explore the personnel sustainability concerning corporate social responsibility, as they note that the issue of personnel sustainability is not disclosed at all. Sheehan, Garavan, and Carbery (2014) introduce the special issue on sustainability, corporate social responsibility, and human resource development. However, they propose that a focus on sustainability and corporate social responsibility will serve to advance the field of human resource development and contribute to enhancing the practices within organizations. Ehnert (2014) studies the strategic potential of sustainability as a concept for Human Resource Management. Aligning sustainability to Human Resource Management allows thinking about new solutions to solve HR problems, such as HR shortages, employee health, or HR development, to foster the proactive role of Human Resource Management in developing sustainable business organizations to extend the understanding of Human Resource Management performance. Ehnert, Harry, and Brewster (2014) study the European specifics of sustainable HRM. Mariappanadar (2020) and App, Merk, and Buttgen (2012) found that implementing sustainable HRM practices increases the firm's competitiveness. Diaz-Carrion, Lopez-Fernandez, and Romero-Fernandez (2018) propose developing a sustainable HRM because it has positive effects on companies internally by enhancing employees' satisfaction and commitment toward the organization, and externally by improving the image that the company projects to society.

Jithendran and Baum (2000) emphasize the need to study personnel sustainability to ensure the sustainability of India's tourism industry. They identify the pressing issues confronting human resources development in Indian tourism and potential strategies to address them within the context of sustainability, because sustainability-based "work culture", "professional ethics," and operational practices are basic to sustainability in tourism. Filinkov, Richmond, Nicholson, Alshansky, and Stewien (2011) describe the mathematical formulations underpinning the development of a strategic level, the personnel sustainability planning tool for the Australian Army. The tool considers personnel sustainability in terms of the dynamics of progression through career profiles and the force requirements to meet operational capability demands.

The research showed that the authors study the personnel sustainability in different contexts. Some identify the indicators and predictors of the personnel sustainability, and others identify the need to ensure personnel sustainability as

http://dx.doi.org/10.21511/ppm.18(2).2020.31

a competitive advantage of the enterprise. In the international literature, one can find the definition "sustainable HRM". Therefore, a certain duality of ensuring the personnel sustainability of the enterprise was revealed. On the one hand, it is a process of purposeful managerial influence aimed at reducing employee turnover and achieving the optimal level of quantitative parameters of the personnel sustainability for the company. On the other hand, it is creating favorable conditions for the development of competent staff.

The personnel sustainability of the enterprise is a certain dynamic state of the personnel management system, which characterizes its ability to maintain efficiency under the influence of internal and external transformations by ensuring a balance of quantitative and qualitative parameters of the personnel sustainability aimed at meeting the needs and requests of employees, which reflects the peculiarities of ensuring the personnel sustainability of the enterprises and the need to create competitive conditions for its development. The procedure of diagnostics and forecasting of the enterprise personnel sustainability is developed for determining the assessment and forecast indicators of the personnel sustainability, which contain indicators for assessing the resilience of staff and predictors of its violation.

2. AIMS

The study aims to develop a procedure for diagnostics and predicting the personnel sustainability of the enterprises due to the construction of the forecast model "PMPS", which provides for the separation of evaluative and predictive indicators of sustainability.

3. METHODS

The diagnostic process of enterprise personnel sustainability includes three stages. The first stage is evaluating personnel sustainability. Assessment of the personnel sustainability indicators involves their measurement based on selected indicators, enabling the identification of the state of the enterprise personnel sustainability system. The second stage is monitoring the personnel sustainability state that consists of constant monitoring of changes in quantitative and qualitative indicators of the personnel sustainability to identify on time the reasons for the violation of key sustainability indicators. Forecasting the personnel sustainability due "Predictable Model of the Personnel Sustainability" involves the establishment of predictors that may indicate future violations of the enterprise personnel sustainability and change the existing trend of their ratio of key parameters of sustainability. Forecasting allows identifying "turning points" in the current trend of personnel sustainability and predicting when they will change direction. Thus, one of the most important tasks in the diagnostics of personnel sustainability is to predict and prevent layoffs.

3.1. Evaluation of the personnel sustainability

The first stage is evaluation of the personnel sustainability is assessed based on a balance of quantitative and qualitative indicators. The number of indicators of sustainability includes five indicators, which, in the author's opinion, consist of the following indicators presented in Table 1 (Zakharova, 2016; Lukashevych, 2004).

3.2. Monitoring the state of the personnel sustainability

The second stage consists of monitoring quantitative and qualitative indicators of the personnel sustainability and timely detection of violations. Interpretation of diagnostic indicators is individual for each enterprise. The decision to dismiss rarely happens at one time. Most often, the employee accumulates a critical mass of dissatisfaction. This research shows that the reasons for employee dissatisfaction are mainly hygienic factors, according to Herzberg (1968), such as competitive level of remuneration, social status, interpersonal relationships with colleagues and management, working conditions, the degree of direct control over the work. The list of indicators proposed by the authors for monitoring the state of the personnel sustainability consists of level of remuneration, career growth prospects, satisfaction of working conditions, atmosphere in the team, content of the work, availability of social guarantees, work schedule.

Table 1. Indicators for evaluating the enterprise personnel sustainability

Indicator	Calculation
Indicators of employee turnover	
1. Employee turnover rate (K_o)	$K_o = \frac{As + Ds}{ANS} \cdot 100\%,$ As – accepted staff; Ds – dismissed staff; ANS – average number of staff
2. Partial coefficient of employee turnover on accepted ($K_{o.ac.}$)	$K_{o.ac.} = \frac{As}{ANS} \cdot 100\%$
3. Partial coefficient of employee turnover on dismissed ($K_{o.dis.}$)	$K_{fm} = \frac{Ds_1 + Ds_2}{ANS} \cdot 100,$
Indicators of personnel fluctuation movement	
1. Total coefficient of fluctuation movement of personnel (K_{fm})	$K_{fm} = \frac{Ds_1 + Ds_2}{ANS} \cdot 100,$ Ds_1 – unsolicited dismissal staff; Ds_2 – staff of punitive discharge
2. Partial coefficient of fluctuation movement of personnel ($K_{fm.p}$)	$K_{fm.p} \frac{Ds_1 + Ds_2}{ANS} \cdot 100\%$ (characterizes the level of fluctuation movement of personnel for individual departments or groups of employees and it's determined similarly K_{fm}
3. Coefficient of intensity of fluctuation movement of personnel (K_i)	$K_i = \frac{K_{fm.p}}{K_{fm}} \cdot 100\%$
Indicator of personnel stability	
1. Coefficient of the personnel stability ($K_{st.}$)	$K_{st} = \frac{St}{ANS} \cdot 100\%,$ St – employees who at the time of analysis had work experience at the enterprise for 5 years or more
Indicators of personnel mobility	
1. Coefficient of general labor mobility (K_m)	$K_m = \frac{As + Ds + P}{ANS},$ P – permanent staff
2. Coefficient of adaptation (K_{ad})	$K_{ad} = As - Ds,$
3. Coefficient of jobs covered by mobility processes (K_{mr})	$K_{mr} = \frac{J}{ANS},$ J – the number of jobs covered by mobility
Indicators of personnel structure	
1. Coefficient of the personnel structure of the enterprise (K_{str})	$K_{str} = \frac{P_s}{ANS},$ P_s – shares of personnel of each of the separate groups of personnel of the enterprise
2. Coefficient of conformity of qualification of employees to the level of difficulty of the performed works (K_q)	$K_q = \frac{T_e}{T_w},$ T_e – the average tariff category of a group of employees; T_w – the average tariff category of work performed
3. Coefficient of conformity of qualification of employees (K_{qe})	$K_{qe} = \frac{K_{pkv}}{K_{pkp}},$ K_{pkv} – number of professional qualification requirements; K_{pkp} – the total number of such requirements for the specialty (position)

http://dx.doi.org/10.21511/ppm.18(2).2020.31

Regular monitoring (through surveys) of personnel sustainability indicators and detection of their sharp fluctuations provides information on employee dissatisfaction with working conditions, which can increase turnover, reduce work motivation, and general violations of the personnel sustainability. The greatest difficulty is the analysis of the factor "level of remuneration", which is one of the most common reasons for dismissal. It is proposed to evaluate the personnel sustainability indicators on a ten-point scale every six months. This period is enough for the employee to form his/her opinion about the job (if he/she is working recently) or to have new information about the labor market opportunities for similar professions. This stage is intermediate between analysis and forecast, and the proposed indicators can be used in the forecast model.

3.3. Predictable model of the personnel sustainability

It is proposed to use forecasting analytics, in particular, based on calculated data on personnel sustainability indicators, to build forecasting models, which aim to assess and forecast fluctuation movement of the personnel sustainability, and to prevent staff redundancies. For this purpose, Predictable Model of Personnel Sustainability "PMPS" is offered. The forecasting model "PMPS" proposed by the author is based on the trend forecasting method's application, which allows extrapolating the trend identified by the results of calculations for a certain period in the future.

To predict the personnel sustainability, the indicators are identified that contain quantitative indicators of the personnel sustainability: accounting number of full-time employees (N_{fe}), total coefficient of fluctuation movement of the personnel (K_{fm}), employee turnover rate (K_o), coefficient of adaptation (K_{ad}), coefficient of the personnel structure of the enterprise with the average salary (K_{st}), wage fund (W), average salary (AS), as well as some predictors identified as a result of the expert survey, which can confirm the dismissal of staff: the correlation the average salary at the enterprise with the average level of wages in the industry (CAS), the number of hours worked (N_{hw}), the number of hours of unscheduled vacations (N_{hu}), the number of people who took unscheduled leave (S_{ul}).

The availability of analytical data determines the choice of individual predictors from all in the study process.

The analyzed indicators change in different directions, changes can be positive and negative, and the scale of their change can also differ significantly. Therefore, to take into account these trends, it is proposed to analyze eleven indicators of personnel sustainability in three areas:

1) sustainability (characterizes the sustainability of the studied trend of change of indicators);

2) scale of change (demonstrates the scale of changes in personnel sustainability indicators);

3) structure (demonstrates the depth of changes in individual indicators of personnel sustainability, determining the individual directions and trends of its change).

Table 2. Predictive characteristics of changes in the personnel sustainability depending on the value of the indicator K_s

The number of positive changes in analytical indicators over the past six years	Forecast of the personnel sustainability changes of the enterprises for the next six years
5-6	There is a steady positive trend towards increasing personnel sustainability, the probable increase (0.6 – 1.0)
3-5	Strengthening the personnel sustainability is unlikely, the trend of changing the personnel sustainability with a high degree of probability will remain similar to the previous period
1-3	High probability of reducing the personnel sustainability of the enterprise and deterioration of the personnel sustainability indicators with probability (0.7 – 0.8)
0-1	High probability of deterioration of values of indicators of the personnel sustainability (0.9 – 1.0)

1. The analysis of the personnel sustainability indicators of "first area – sustainability" is based on the calculation of the number of positive changes in indicators. For this purpose, the coefficient of sustainability K_s was used:

$$K_s = \frac{\sum_{i=1}^{n} p_i}{n}, \quad (1)$$

where p_i – the number of positive elements of the i-th line; n – the number of indicators (lines).

2. To analyze "the scale of change" in the personnel sustainability, it is proposed to calculate the coefficient of scale (K_{sc}), in which the average changes in indicators for the period are related to the number of such indicators.

$$S_i = \sum_{j=1}^{m} a_{ij}, \quad (2)$$

where S_i – the sum of the elements in the i-in of the line; a_{ij}– the elements of the j-th column and the i-th of the line; n – the number of indicators (lines).

$$\hat{E}_{sc} \frac{\sum_{i=1}^{n} S_i}{n}, \quad (3)$$

where S_i – the sum of the elements in the i-in of the line; n – the number of indicators (lines).

Table 3. Predictive characteristics of the scale of change in the personnel sustainability depending on the value of K_{sc}

Average values of changes of personnel sustainability K_{sc}	Forecast of the scale of changes in the personnel sustainability of the enterprise for the next six years
8-25%	Significant strengthening
0-8%	Moderate strengthening
–5-0%	Moderate weakening
–12-(–5)%	Significant weakening

3. To calculate the personnel sustainability's structural coefficients, the indicators were divided into structural blocks (Table 4).

Table 4. Distribution of personnel sustainability indicators by structural blocks

Group of indicators	Indicators
Indicators of personnel turnover	K_{fm}, K_o, K_{ad}
Quantitative characteristics of staff	N_{fe}, S_{ul}
Level of wages	W, AS, CAS
Predictors of dismissals	K_{st}, N_{hw}, N_{hu}

To calculate the values of structural indicators, the coefficient of the personnel turnover (K_{ot}), the coefficient of quantitative characteristics (K_{qc}), the coefficient of wages (K_w), the coefficient of predictors of dismissal (K_{pr}) are offered (see formulae (4)-(7)):

$$K_{\hat{i}t} = \frac{\sum_{j=1}^{m} a_{2j} + \sum_{j=1}^{m} a_{3j} + \sum_{j=1}^{m} a_{4j}}{3}, \quad (4)$$

$$K_{qc} = \frac{\sum_{j=1}^{m} a_{1j} + \sum_{j=1}^{m} a_{11j}}{2}, \quad (5)$$

$$K_w = \frac{\sum_{j=1}^{m} a_{6j} + \sum_{j=1}^{m} a_{7j} + \sum_{j=1}^{m} a_{8j}}{3}, \quad (6)$$

$$K_{pr} = \frac{\sum_{j=1}^{m} a_{5j} + \sum_{j=1}^{m} a_{9j} + \sum_{j=1}^{m} a_{10j}}{3}. \quad (7)$$

The initial data for forecasting the personnel sustainability based on selected indicators are presented in the form of percentage changes in indicators compared to the previous period. There were chosen six periods (in this case – years), respectively, the forecasting period is also the next six years. It should be noted that the chosen forecast period is medium-term, which may be unjustified in the turbulent changes in the economy, politics, and labor market, as the personnel sustainable during the forecast period may be unexpectedly affected by unforeseen factors. Therefore, the forecast period can be reduced to six other periods (quarters or months), but then the initial data for the model must be presented quarterly or monthly.

The practical result of the proposed model "PMPS" is the ability to prevent layoffs by creating competitive working conditions at the enterprise.

http://dx.doi.org/10.21511/ppm.18(2).2020.31

4. RESULTS

The approbation of the method was carried out on the example of the Ukrainian enterprises of a recreational complex. The recreational complex of Ukraine is a promising and rapidly growing segment of the services sector (Bayeva, 2008). There are 284 sanatoriums and boarding houses, 67 sanatoriums, and 55 rest homes in Ukraine. Features of personnel management in this area are because the enterprises of the recreational complex are characterized by high customer focus. In conditions of growing competition in the labor market, it is necessary to timely monitor the changes in customer needs, improve the quality of services provided and the quality of service, to form sustainable corporate values that should be customer-oriented. These and other values are displayed in such enterprises' personnel, whose employees must share corporate values, store and transmit them to customers, and maintain loyalty to the employer. The importance of the recreational complex in ensuring the economic growth of Ukraine and the importance of ensuring the personnel sustainability of recreational enterprises determined the choice of such an enterprise for data testing and verification obtained during the study.

4.1. Evaluation of the personnel sustainability of the enterprises of the recreational complex

The approbation of the analysis of the personnel sustainability indicators was carried out according to the data of three enterprises of the recreational complex of Ukrprofzdorovnytsia – "Khmilnyk Clinical Sanatorium", Clinical sanatorium "Vysokyi", Clinical sanatorium "Avangard" from 2016 to 2018.

According to the research results, the value of indicator K_{fm} of "Khmilnyk Clinical Sanatorium" fluctuated from 5.2 to 9.6, which means permissible values. It should be emphasized that the company is undesirable as excessive (12-25%) and understated (3-5%) fluctuation movement of personnel. In the first case, it leads to destabilization of the workforce, in the second – to aging, which hinders the restoration of the quality composition of personnel or quality of the workforce (education, real skills, intellectual abilities, physical skills, psychological stability, and work experience). The value of indicators $K_{o.ac}$ and $K_{o.dis}$ indicate the presence of normal staff movement in the enterprise. From 2016 to 2018, it ranges from 1.68 to 11.2 and from 5.3 to 9.6, respectively. The negative coefficient of adaptation at the enterprise in 2016 raises the questions. So, the indicator K_{ad} demonstrates the number of employees who have successfully adapted and remained to work at the company. The number of dismissed employees in 2016 by 17 people exceeded the number of hired. That is why the indicator had a negative value.

Analysis of clinical sanatorium "Vysokyi" shows that the indicator K_{ad} is negative in 2017 and 2018, proving that the number of dismissed employees in these periods exceeds the number of accepted. It may also indicate that employees do not adapt and are not delayed in the workplace, that employment conditions do not suit the share of employees. This is also evidenced by the indicator $K_{o.dis}$, and it was 24.24 % in 2016 and 19.6 % in 2018. The value of K_{fm} is within the industry norm, with uneven dynamics of 24.2% in 2016, 8.9% in 2017, 19.6% in 2018. In general, the personnel sustainability indicators show positive dynamics, except for the coefficient of adaptation.

Table 5. Some indicators for evaluating the personnel sustainability of the enterprises (based on own calculations)

Indicator	"Khmilnyk Clinical Sanatorium"			Clinical sanatorium "Vysokyi"			Clinical sanatorium "Avangard"		
	2016	2017	2018	2016	2017	2018	2016	2017	2018
K_{fm}	5.2	9.6	8.3	24.2	8.9	19.6	95.5	94.1	97.7
K_{o}	6.96	19.9	19.55	59.1	0.125	29.4	184.6	185.5	208.6
$K_{o.ac.}$	1.68	10.2	11.2	34.8	3.5	9.8	89.1	91.44	110.9
$K_{o.dis.}$	5.3	9.6	8.4	24.24	8.9	19.6	95.5	94.1	97.7
K_{ad}	–17	3	14	7	–3	–5	–10	–4	23
K_{str}	21	38	40	19	7	12	24	8	12

Analysis of clinical sanatorium "Avangard" shows that the value of indicator K_{ad} is negative in 2016 and 2017. The reasons for this are the same as in the previous enterprise. According to the results of the analysis of only quantitative indicators, it can be concluded that the employment conditions do not satisfy the majority of employees because the value of indicators $K_{o.dis}$ and $K_{o.ac}$ proves that 97.7% of personnel were released in 2018, 110.9% of those accepted (including previous periods) were released in 2018. The value of K_{fm} = 97.7%, which can be qualified as critical values. The dynamics of all indicators of personnel sustainability are negative, so one can conclude that the enterprise has serious personnel sustainability problems. The reasons for this should be identified based on additional research by identifying employees' views on key issues of the personnel sustainability. The results of the analysis revealed that the indicators of the sustainability of the studied enterprises are significantly different. That is why the tasks of ensuring the personnel sustainability of the studied enterprises are fundamentally different.

4.2. Monitoring the state of the personnel sustainability of the enterprises of the recreational complex

The survey was conducted among employees who currently work at enterprises: "Khmilnyk Clinical Sanatorium", Clinical sanatorium "Vysokyi", Clinical sanatorium "Avangard," according to the indicators proposed in sub-section 3.2. The research showed that the first three reasons for dismissal indicated are dissatisfaction with the level of remuneration (44%), lack of career prospects (36%), dissatisfaction with working conditions (22%) (Figure 1).

Dismissal monitoring is based on gathering information about employees who have resigned or are about to resign with a detailed analysis of the reasons for dismissal, new employment conditions (this will determine the competitive advantages of the company as an employer, comparison of the

Source: Author's expert survey (results of the author's expert survey from "The personnel sustainability of the enterprise: factors and methods of support", 2019).

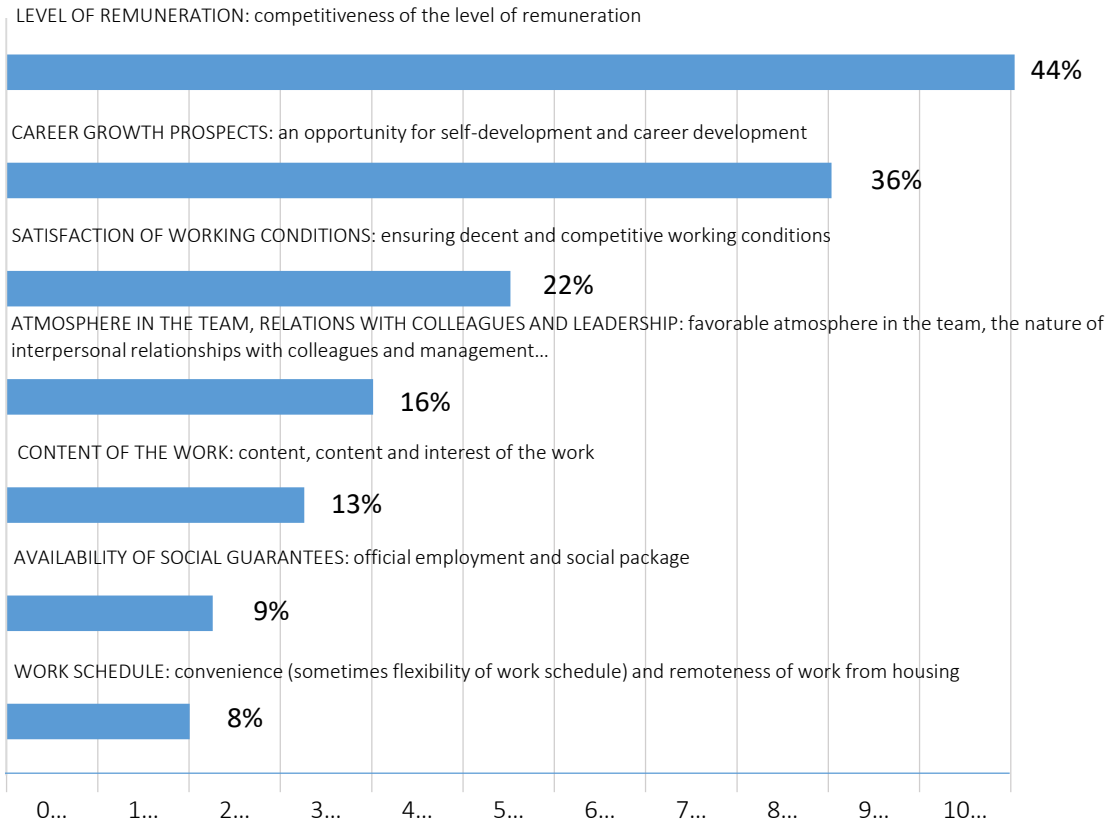

Figure 1. The hierarchy of indicators of personnel sustainability

http://dx.doi.org/10.21511/ppm.18(2).2020.31

profiles of dismissed employees with the profiles of employees allows identifying similar characteristics of employees, and the profiles of those who wanted to resign, but decided to stay, will enable to develop recommendations for HR to retain employees); employees who work; behavioral characteristics of employees (the monitoring process should identify certain models of employee behavior that may indicate an intention to leave the company).

4.3. Predicting personnel sustainability using "PMPS" by the example of "Khmilnyk Clinical Sanatorium"

The initial data for the forecast model "PMPS" are given in Table 6.

Using the formula (1), the value of the indicator K_s = 3.54 was calculated. This value of the indicator K_s can be interpreted as one in which strengthening the enterprise personnel sustainability is unlikely. The tendency to change the personnel sustainability of the enterprise with a high degree of probability will remain similar to the previous period.

Using the formulae (2) and (3), the values of K_{sc} of the personnel sustainability of "Khmilnyk Clinical Sanatorium" were calculated for the period 2013–2018:

$$K_{sc} = (20.25 + (-110.21) + 232 + (-96.02) + +461.45 + 401.98)/11/6 = 13.74.$$

Thus, the estimated value of the scale of change in the enterprise personnel sustainability indicates a significant strengthening of personnel sustainability for the forecast period, which, according to the results of calculations, should be observed in the next six periods.

Analyzing the changes in personnel sustainability over the past six years, one can conclude the sustainability and scale of the projected changes in indicators. However, determining the sustainability and scale of changes in forecast indicators does not yet allow us to conclude the depth of such changes or structural changes. Therefore, to obtain a complete forecast, it is necessary to calculate separate structural coefficients, demonstrating the change of individual predictors of violation of the personnel sustainability. This will help to conclude about as far as structural changes in indicators are deep.

Table 6. The data for predicting the personnel sustainability of "Khmilnyk Clinical Sanatorium" for the period 2013–2018 (based on own calculations)

Indicators	Dynamics of change of indicators (in % of the previous period)						The number of positive changes in indicators
	2013	2014	2015	2016	2017	2018	
N_{fe}	0	–2.18	–0.2	–3.5	0.63	2.93	2
K_{fm}	4.5	9.7	–22.1	–67.3	35.5	–13.5	3
K_o	19.9	–21.9	21.6	–69.7	185.9	1.76	4
K_{ad}	–153	–150	–22.1	86.2	117.64	366.7	3
K_{st}	–16.6	–33.3	11.1	5	80.95	5.26	4
W	1	–1.07	24.9	–19.52	55.99	33.62	4
AS	1	1.13	25.1	23.8	35.5	29.79	6
CAS	–5.55	–1.19	6.67	3.33	5.37	10.2	4
N_{hw}	1	–0.02	3.93				2
N_{hu}	127	17.44	13.9	3.97	–8.83	–21.6	4
S_{ul}	41	69	169	–61.8	–46.57	–10.25	3
Total	–	–	–	–	–	–	50
The sum of changes in indicators	20.25	–112.39	231.8	–99.52	462.08	404.91	907.13

Table 7. Interpretation of indicators of the personnel sustainability by structural units

Group of structural indicators	Estimated value	Direction of change	Forecast
K_o	109.93	Significant increase	A significant estimated increase of the indicator K_o should be considered a negative factor, which leads to a violation of personnel sustainability. The scale of change K_{ot} indicates future large-scale changes in fluctuation movement of personnel and other turnover indicators
K_{qc}	79.03	Significant increase	Changing the quantitative components of personnel indicates about future changes in similar indicators That is, the accounting component of staff will grow from the indicator CAS
K_w	76.69	Significant increase	Changes in the structural components of wages indicate probable future changes in these indicators (while in the structure of this coefficient of change of the indicator, which characterizes wages' competitiveness, is 18.83)
K_{pr}	63.1	Significant increase	Changing predictors of staff reductions indicate likely staff redundancies in the future

Table 8. Generalized results of personnel sustainability forecasting of the subsidiary company "Khmilnyk Clinical Sanatorium" for 2020–2024

K_s	K_{sc}	Group of the structural coefficients of personnel sustainability indicators
$K_s = 3.54$ Strengthening personnel sustainability is unlikely	$K_{sc} = 13.74$ The estimated value of the indicators indicates a significant strengthening for the forecast period	The indicator $K_{ot} = 109$ indicates a future increase in fluctuation movement of personnel and other turnover indicators The accounting component of the staff will grow because $K_{qc} = 79$ Changes in the structural components of wages indicate about possible future changes in these indicators $K_w = 76.7$; Changing predictors of staff reductions indicate likely staff redundancies in the future $K_{pr} = 63.1$

The values of indicators and detection of their forecast changes are shown in Table 7.

Dynamics of change of indicators of the personnel sustainability "Khmilnyk Clinical Sanatorium" from 2014 to 2019 are shown in Figure 2.

Thus, according to Figure 2, the tendency to change indicators for the last period is generally negative, which testifies to the forecasted insignificant deterioration of the investigated enterprise personnel sustainability. The largest amplitude of change among personnel sustainability indicators is observed in the value of K_{ad}; the largest changes occurred in 2018. Generalized results of the personnel sustainability forecasting of "Khmilnyk Clinical Sanatorium" for 2020–2024 are shown in Table 8.

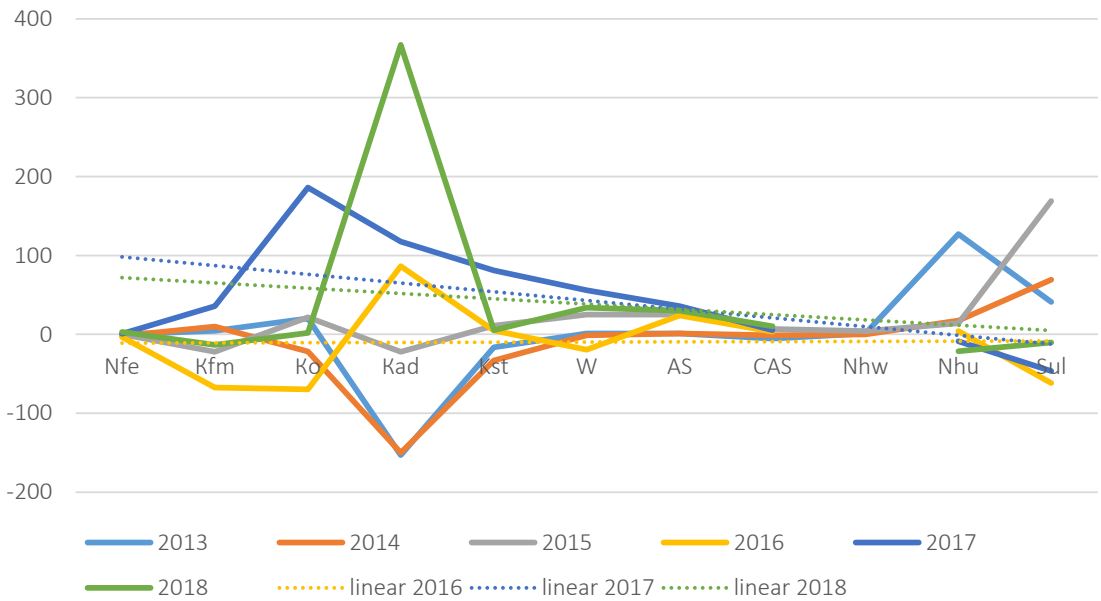

Figure 2. Dynamics of change of indicators of the personnel sustainability "Khmilnyk Clinical Sanatorium" from 2013 to 2018

http://dx.doi.org/10.21511/ppm.18(2).2020.31

CONCLUSION

Consequently, diagnostics of the enterprise personnel sustainability involves recognizing the problem and marking it using the accepted terminology, that is, the diagnosis of an abnormal condition of the phenomenon under study. The proposed process of diagnostics of the personnel sustainability contains three stages: evaluation, monitoring, and forecasting of indicators of the personnel sustainability. It is proposed to use the forecast model of the personnel sustainability "PMPS", which provides an opportunity to track the general trend of the personnel sustainability, based on the analysis of relative changes in the personnel sustainability indicators and predict changes in the personnel sustainability for the next six periods.

The first and second stages of diagnostics were tested on three enterprises of the recreational complex of Ukrprofzdorovnytsia – "Khmilnyk Clinical Sanatorium", Clinical sanatorium "Vysokyi", Clinical sanatorium "Avangard" from 2016 to 2018. "Khmilnyk Clinical Sanatorium" is characterized by relatively stable indicators of the coefficient of personnel fluctuation movement and employee turnover. However, the value of the coefficient of adaptation is negative. The similar situation is on clinical sanatorium "Vysokyi". It was possible to conclude that the personnel sustainability of the enterprise increases. The dynamics of all indicators of the personnel sustainability of clinical sanatorium "Avangard" is negative, so the company has serious problems with ensuring personnel sustainability. Monitoring the personnel sustainability on the proposed indicators revealed the main reasons for dismissal, affecting the indicators of sustainability. The first three reasons for dismissal indicated are dissatisfaction with the level of remuneration 44%, lack of career prospects 36%, dissatisfaction with working conditions 22%. The third stage is predicting the personnel sustainability tested on "Khmilnyk Clinical Sanatorium". It was found that the personnel sustainability continues to decline, the extent of the violation of the personnel sustainability is significant due to high forecasts of employee turnover and personnel fluctuation movement, and trends in the predictors of sustainability disturbances signal the possible dismissal of staff in the future.

In the future research, the forecast of the personnel sustainability requires the analysis of the concrete reasons for infringement, formation, and introduction of special social marketing technologies to ensure the personnel sustainability and prevent violations of its stability.

AUTHOR CONTRIBUTIONS

Conceptualization: Iryna Trunina, Denys Zagirniak, Kateryna Pryakhina, Tetyana Bezugla.
Data curation: Iryna Trunina, Denys Zagirniak, Kateryna Pryakhina, Tetyana Bezugla.
Formal analysis: Kateryna Pryakhina, Tetyana Bezugla.
Funding acquisition: Kateryna Pryakhina.
Investigation: Iryna Trunina, Denys Zagirniak, Kateryna Pryakhina, Tetyana Bezugla.
Methodology: Kateryna Pryakhina, Tetyana Bezugla.
Project administration: Iryna Trunina.
Resources: Kateryna Pryakhina.
Supervision: Denys Zagirniak.
Validation: Iryna Trunina, Denys Zagirniak, Kateryna Pryakhina, Tetyana Bezugla.
Visualization: Kateryna Pryakhina, Tetyana Bezugla.
Writing – original draft: Denys Zagirniak, Kateryna Pryakhina, Tetyana Bezugla.
Writing – review & editing: Kateryna Pryakhina.

REFERENCES

1. Alferova, Ya. (2012). Staffing stabilization in the company. *Modern Studies of Social Problems, 8*(16), 1-12. (In Russian). Retrieved from https://cyberleninka.ru/article/n/stabilizatsiya-personala-v-organizatsii/viewer
2. Andrunik, A., Ostapenko, G., & Kosykyn, S. (2016). Artificial intelligence as a tool for diagnostics of personnel competences. *Innovation Management, Entrepreneurship and Corporate Sustainability (IMECS 2016)*, 21-34. Retrieved from https://www.ceeol.com/search/chapter-detail?id=479957
3. App, S., Merk, J., & Buttgen, M. (2012). Employer Branding: Sustainable HRM as a Competitive Advantage in the Market for High-Quality Employees. *Management Revue, 23*(3), 262-278. Retrieved from https://www.jstor.org/stable/41783721?seq=1
4. Bayeva, O. (2008). *Orhanizatsiino-ekonomichni zasady upravlinnia turystychno-rekreatsiinymy kompleksamy [Organizational and economic principles of management of tourist and recreational complexes]*. Simferopol: Publishing Center of the Crimean Institute of Business. (In Ukrainian)
5. Diaz-Carrion, R., López-Fernández, M., & Romero-Fernandez, P. M. (2018). Developing a sustainable HRM system from a contextual perspective. *Corporate Social Responsibility and Environmental Management, 25*(6), 1143-1153. https://doi.org/10.1002/csr.1528
6. Ehnert, I. (2014). Paradox as a Lens for Theorizing Sustainable HRM. In I. Ehnert, W. Harry, & K. Zink (Eds.), *Sustainability and Human Resource Management* (pp. 247-271). CSR, Sustainability, Ethics & Governance. Springer, Berlin, Heidelberg. Retrieved from https://link.springer.com/chapter/10.1007%2F978-3-642-37524-8_11
7. Ehnert, I., Harry W., & Brewster, C. J. (2014). Sustainable HRM in Europe. In I. Ehnert, W. Harry, & K. Zink (Eds.), *Sustainability and Human Resource Management* (pp. 339-357). CSR, Sustainability, Ethics & Governance. Springer, Berlin, Heidelberg. Retrieved from https://link.springer.com/chapter/10.1007%2F978-3-642-37524-8_15
8. Filinkov, A., Richmond, M., Nicholson, R., Alshansky, M., & Stewien, J. (2011). Modelling personnel sustainability: a tool for military force structure analysis. *Journal of the Operational Research Society, 62*(8), 1485-1497. https://doi.org/10.1057/jors.2010.85
9. Herzberg, F. (2003). One more time: How do you motivate employees? *Harvard Business Review.* Retrieved from http://college.emory.edu/faculty/documents/resources-chairs/One_More_Time__How_Do_You_Motivate_Employees.pdf
10. Jithendran, K. J., & Baum, T. (2000). Human resources development and sustainability – the case of Indian tourism. *International Journal of Tourism Research, 2*(6), 403-421. https://doi.org/10.1002/1522-1970(200011/12)2:6<403::AID-JTR239>3.0.CO;2-3
11. Khrystynko, L., & Butkova, N. (2011). Model ekonomichnoi stiikosti promyslovoho pidpriemstva [Model of economic stability of an industrial enterprise]. *Bulletin of Khmelnytsky National University, 5,* 131-134. (In Ukrainian)
12. Kuzniarska, A. (2018). Pillars of Creating Sustainable Personnel in an Organization. *Przedsiebiorczosc i Zarzadzanie – Entrepreneurship and Management, 19*(6), 159-172. Retrieved from https://www.researchgate.net/publication/336474231_Pillars_of_Creating_Sustainable_Personnel_in_an_Organization
13. Lenskaya, I. (2016). Stabylyzatsiya i uderzhanie personala: ponyatiynyy analiz [Stabilization and retention: a conceptual analysis]. *Bulletin of Economics, Law and Sociology, 2,* 279-281. (In Russian). Retrieved from https://cyberleninka.ru/article/n/stabilizatsiya-i-uderzhanie-personala-ponyatiynyy-analiz/viewer
14. Lukashevych, M. (2004). *Sotsiolohiia pratsi: Pidruchnyk [Sociology of labor: Textbook]*. Kyiv: Lybid. (In Ukrainian). Retrieved from https://sociology.knu.ua/ru/library/sociologiya-praci-pidruchnik
15. Makedon, V., Hetman, O., Yemchuk, L., Paranytsia, N., & Petrovska, S. (2019). Human Resource Management for Secure and Sustainable Development. *Journal of Security & Sustainability Issues, 8*(3), 345-354. https://doi.org/10.9770/jssi.2019.8.3(5)
16. Mariappanadar, S. (2020). Implementing Sustainable HRM Practices. In *Sustainable Human Resource Management: Strategies, Practices and Challenges* (pp. 157). Publisher: Red Globe Press. Macmillan International UK. Retrieved from https://www.researchgate.net/publication/341606268_Implementing_Sustainable_HRM_Practices
17. Panyukov, V. (1976). *Ustojchyvost kadrov v promyshlennosti (teoriya i metody socyaljnoho upravleniya) [Sustainability of personnel in industry (theory and methods of social management)]* (167 p.). Kyiv. (In Russian).
18. Pochtovyuk, A., & Pryakhina, K. (2020). Scientific instrumentarium for diagnostics of staffing at the Ukrainian machine-building enterprises: marketing approach. In *SHS Web of Conferences, 73,* 01022). https://doi.org/10.1051/shsconf/20207301022
19. Sheehan, M., Garavan, T. N., & Carbery, R. (2014). Sustainability, corporate social responsibility and HRD. *European Journal of Training and Development, 38*(5), 370-386. https://doi.org/10.1108/EJTD-04-2014-0034
20. Vartanova, O. V. (2019). Predyktory zvilnennia personalu v systemi zabezpechennia yoho stiikoho rozvytku [Predictors of the staff layoffs in the system of provision of its sustainable development]. *Collection of scientific works of Cherkasy State Technical University. Series: economic sciences, 54,* 10-16. (In Ukrainian).

http://dx.doi.org/10.21511/ppm.18(2).2020.31

https://doi.org/10.24025/2306-4420.0.54.2019.178547

21. Vartanova, O. V. (2019). Zabezpechennia stiikosti personalu na osnovi tekhnolohii marketynhu personalu [Providing the staff resilience of the company based on the personnel marketing technologies]. *Problems of system approach in economy, 4*(72), 97-102. (In Ukrainian). https://doi.org/10.32782/2520-2200/2019-4-12

22. Veerasamy, A., Loch, C., Adam, L., Howe, B. J., & Brunton, P. A. (2018). Challenges in clinical teaching investigated: Towards sustainable staff recruitment and retention in dentistry. *European Journal of Dental Education, 22*(4), 234-242. https://doi.org/10.1111/eje.12336

23. Whitman, D. (2004). *Motivatsia i stabilnost personala v organizatsii [Motivation and stability of staff in the organization]* (Ph.D. Thesis). (In Russian). Retrieved from https://www.dissercat.com/content/motivatsiya-i-stabilnost-personala-v-organizatsii

24. Zakharova, O. (2016). Metodolohiia analizu trudovykh pokaznykiv na rivni pidpryiemstva. [Methodology of analysis of labor indicators at the enterprise level]. *Ukraine: aspects of work, 7-8,* 18-26. (In Ukrainian). Retrieved from https://er.chdtu.edu.ua/handle/ChSTU/397

25. Zelinska, G. (2017). Otsiniuvannia stiikosti personalu yak odyn z napriamiv pidvyshchennia rezultatyvnosti upravlinnia naftohazovymy pidpryiemstvamy u suchasnykh umovakh funktsionuvannia [Assessment of the personnel sustainability as one of the directions of improving the effectiveness of management of oil and gas enterprises in modern modern]. *State regulation of transformation and innovative development of socio-economic systems, 10,* 149-154. (In Ukrainian)

26. Zijlstra, E. E., & Broadhead, R. L. (2007). The College of Medicine in the Republic of Malawi: towards sustainable staff development. *Human Resources for Health, 5*(10). https://doi.org/10.1186/1478-4491-5-10