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METHOD OF FORECASTING THE FORMATION OF CORPORATE SOCIAL RESPONSIBILITY AT ENGINEERING ENTERPRISES

Definition of the problem. The significance of staff for a successful business enterprise is difficult to overestimate. The sphere of engineering, which is one of the labor-intensive and knowledge-intensive activities, depends greatly on the professionalism of the workforce. This determines the necessity of correspondence of profession and qualification requirements of staff to job descriptions. This allows an employee to realize their professional qualifications and meet the needs of the employer. This also complies with the process of achieving the social partnership in labour relations. Therefore, the problems of improving the structure of personnel, its modernizing, formation, and preservation of human resources are of a particular importance. The formation of personnel depends on the decisions taken by the employee and the employer. This presupposes some particular responsibility in the actions of both sides of labor relations, which is beyond the formal agreements, arrangements, and legislative sphere and comes from ethical and labour behavior. Such is the corporate social responsibility (CSR) which is presented by the managerial staff and the employees and assumes social and labour partnerships in the labour market of the company. At the same time, the actions of the sides in labour relations affect the state of the socio-economic environment. Dynamics and character of its changes are partially predictable, and it is impossible to take into account the changes and measure the impact of the activities that form the environment. Under these conditions, the model of socially responsible behavior of enterprises should be considered from the standpoint of possible directions of the external environment and their current trends. Therefore, the method of determining the state of CSR at engineering firms which can justify the directions for its regulations is required.

Analysis of recent research and publications. The works on issues of forecasting, assessment and formation of CSR describe three approaches to studying them. Thus, Y. Hong, M. Anderson, S. Valentine, G. Fleyshmen, T. Shevchenko [1; 2; 3] provide the methodology for evaluating the level of CSR. The supporters of the second approach (M. Kelehsayeva, L. Hrytsyna, V. Malghin [4; 5; 6]) offer general advice on the formation of the CSR. A. Polyanska, A. Monits, D. Aaker [7; 8; 9] support the third approach; they study the tools of forecasting the aspects of business operations and labour relationships of employees and employers.

The analysis of publications shows that authors do not consider the problem of professional qualification compliance according to the context of CSR. Besides, the issue of forecasting the CSR formation has not been studied.

The purpose of the article is to reveal the essence of the scenario forecast method of CSR forming at engineering enterprises through the allocation of internal and external factors affecting the level of professional qualification compliance of the employee's qualities to the employer's requirements.

Findings. The tool which allows taking into account the impact of external factors is the scenario method or scenario forecast, which is part of the strategic planning process. This method is based on the establishment of coherent external events to determine the hypothetical state of professional qualification structure of the enterprise job market in the long term [7, p. 165; 8, p. 211 – 212; 9, p. 92]. Scenario forecast presupposes three states of events: optimistic, pessimistic and the most probable scenario (basic, realistic) [8, p. 213; 7, p. 166].

The basis for the scenario forecast is the problem of the employee's qualities correspondence to their position in the company and the question of forming the employer behavior model. The major external factors of compliance are selected on the basis of their direct or indirect relationship with the company activities in the industry. Experts' availability at the labor market and the popularity of economic activity are among them. They are determined by the results of the economic activity of the industry, by the conditions and the level of payment, and by the structure of specialists' remuneration in higher education.

The economic results reflect the dynamics and trends of the industry. The increase of products sales is accompanied by a growing demand for labor force. Along with the productivity increase the number of employees will decrease, but increasing knowledge intensity and technology of labor determines the growth of employers' requirements to the professional qualities and skills of employees. Thus, quantitative or qualitative specialists are required. Under these conditions, professional HR institutions become very important, and, consequently, the attractiveness of jobs for future specialists is determined by the image of the activity, which is reflected in the level of payment and working conditions. On the other hand, the process of stagnation or recession is accompanied by fall in demand for labour and reduction in the number of employees with a concomitant decrease in the level of payment and the popularity of professions in the industry.

Thus, the trend of activity development directly affects the HR demand and supply structure and indirectly - the structure of professional qualification compliance (PQC).

The working conditions are directly dependent on the structure and level of technological development of the industry. Enterprises with outdated technology and high depreciation do not provide decent working conditions, which adversely affects the productivity [10, p. 126, 11, p. 246] and leads to the increase in staff turnover. If the industry doesn't develop, possibilities for equipment upgrading and innovation are extremely low. Since the depreciation of fixed assets is associated with the time factor, the working conditions deteriorate, thereby, reducing the level of social responsibility of the employer. An employee searching for jobs will be more inclined to choosing the proper conditions for the realization of their professional interests, respectively, the demand for jobs will fall and the employer will be in shortage of professional workforce which will lead to recruiting workers not fully corresponding to the requirements of the positions. Under these circumstances, a negative image of economic activity is formed, which affects the career choices of young professionals, and, therefore, the demand in education sphere [11, p. 247]. In case of improving the quality of working conditions the situation will be reversed. This is connected, on the one hand, with the mandatory development of the industry, on the other hand, with the increase in the employer's interest in attracting, retaining and improving the professional staff. Thus, the conditions forming the image of the industry affect the career choice of labour force and the structure of the PQC personnel.

Likewise working conditions, payment increase is associated with the results of economic activities of an enterprise and its payment policy. The increase in production, sales and output, is usually accompanied by rising incomes of staff. In a situation of stagnation or decrease in production it is difficult to provide decent wages. Payroll is one of the key features that affect employee's motivation, productivity and quality of work and stability [12; 13], and it has a dual character. Decent remuneration for work motivates an employee in maintaining office or place of employment. From this position, the employer's benefit is obvious: costs for staff training or retraining caused by a decreasing staff turnover is reduced, productivity growth has a direct impact on the outcome of its economic activity, employees are interested in manufactured products, etc. On the other hand, payment is an indicator of the attractiveness of the industry and particular companies for employees. It affects the preferences of young people in the choice of profession and place of employment for professionals. So, decent payment provides the conditions to attract skilled professionals by meeting the requirements of the employer, it has an impact on the structure of the labor market, i.e. indirectly affects the personnel professional qualification structure.

Reproduction of professional workforce is one of the most significant factors affecting the structure of the labor market. It is not directly connected with the activities of the company, but depends on the image of the industry and an established system of cooperation with employers. Since the results of economic activity, working conditions and payment form the level of attractiveness of economic activity, they affect the demand and the type of training areas in educational establishments. For example, the decline in industry popularity among labor force leads to a higher demand for knowledge and skills acquisition in another field.

The interaction between businesses and education is important for providing the conditions for the practical skills of future professionals. If factors characterizing the industry indirectly affect the number of specialists, the interaction involves improving the quality of labor force training and acquiring skills that meet the requirements of employers. Unique impact on the reproductive system of personnel professional qualification structure in industry comes from its close relationship with the activities. Labor and economic characteristics of industries affect the structure of production, and, therefore, the number of future professionals who can be involved in work. On the other hand, without interaction the gap between the requirements of the employer and knowledge will increase which, respectively, determines the number of specialists to meet the needs of the employer, and has an indirect effect on PQC.

The internal factors include personnel policy of a company. It directly affects the social responsibilities of staff, as it depends on management decisions, and, therefore, this is a factor that is most controlled. Implementing socially responsible human resources policy can improve the job satisfaction [2, p. 161], leads to growth of the company image in the community [1, p. 463 – 464], the adequacy of the current conditions of HR [4, p. 71 – 72] and interaction with society [6, p. 42 – 44].

Based on these factors, the possible direction of professional qualification compliance development in a company represents one of the three scenarios, the most likely of which comes from the properties of the optimistic and pessimistic scenarios. Table 1 shows the variants of factors development common to the two scenarios.

According to the table, the optimistic scenario is characterized by the positive development of all factors. The growth of the economic performance inevitably leads to improving the quality of working conditions and payment on the basis of adequate HR policies pursued in a company and will be accompanied by the growth of the industry's image and increase in demand for professions. This will lead to the improvement of PQC in industries. On the other hand, the pessimistic scenario reflects the deterioration of all the factors that may be caused by unfavorable market environment, and socially irresponsible personnel policies. Accordingly, the most

likely scenario is derived from consideration of the current state and trends inherent in the structure of enterprise PQC and external factors.

Under such conditions when the real factors do not allow establishing the type of scenario, the method of specifying the influence of each factor on the PQC should be defined. To indicate the PQC the two quality characteristics of an employee are used, i.e. profession and qualification. According to the job descriptions, a job position (role) has requirements for the profession and qualifications which they must meet. Qualitative characteristics of an employee are marked by "E". So, E_p is the employee's profession, E_q – their qualifications. Professional qualifications requirements to the position are marked by "P", while P_p is the position requirements to the employee's profession; P_q is qualification requirements to the position. Job descriptions have five variations: unskilled workers, skilled workers, part-time higher education, Basic Higher Education, University degree.

Compliance of the employee's profession to the job description is of three states: $E_p = P_p$ – full compliance of the employee's profession to the job description; $E_p \approx P_p$ – partial compliance of the employee's profession to the job description; $E_p \neq P_p$ – complete noncompliance of the employee's profession to the job description. Compliance of the employee's qualification to the job description has the following states: $E_q = P_q$ – full compliance of the employee's qualification to the job

description; $E_q > P_q$ – employee's qualification is lower than the job description; $E_q < P_q$ – employee's qualification is higher than the job description. According to the principle of combinatorial multiplication [14, p. 317] the pairs of profession and qualification compliance form nine combinations (hereinafter – the situations), which are assigned with symbols "A" ($E_p = P_p$ and $E_q = P_q$), "B" ($E_p = P_p$ and $E_q > P_q$), "C" ($E_p = P_p$ and $E_q < P_q$), "D" ($E_p \approx P_p$ and $E_q < P_q$), "E" ($E_p \approx P_p$ and $E_q > P_q$), "F" ($E_p \approx P_p$ and $E_q < P_q$), "G" ($E_p \neq P_p$ and $E_q = P_q$), "H" ($E_p \neq P_p$ and $E_q > P_q$) and "I" ($E_p \neq P_p$ and $E_q < P_q$). The group of situations are marked with a_i, where i – index of the situation, $a_i \in \{A, B, C, D, E, F, G, H, I\}$.

Factors influencing PQC, marked by F_t, where t – index of factor, F_1 – the economic results, F_2 – working conditions, F_3 – salaries, F_4 – stuff reproduction system, F_5 – personnel policies. To assess the relationship between variables, which are the factors F_t and PQC situation, it is advisable to use contingency tables where relationships between variables are numerically estimated [15, p. 167 – 168]. However, the use of these tables is allowed for variables whose relationship is difficult to quantify [16, p. 38; 17, p. 65]. Since it is not possible to determine the influence of factors in numerical terms, the vectors of their influence on PQC development are used. Table 2 shows the method for determining the most likely scenario of PQC in the enterprise.

Vectors are marked with f_i, they have five states:

Table 1

Change scenarios of enterprise professional qualification structure in engineering industry

Factor	Scenario	
	optimistic	pessimistic
Internal		
HR policy	Aimed at achieving social partnership and ensuring a balance between professional continuity and staff renovation	Does not meet the conditions of socially responsible behavior, staff selection and placement conducted according to the interests of the employer
External		
The results of economic activity	Production volumes are growing, fixed assets are renewed, innovation is active, productivity is increasing, demand for unskilled labor force is reducing, qualified specialists are in demand	Production is declining or is at a standstill, productivity is stagnant or declining, deterioration prevails, innovative activity is minimized
Working conditions	Improving or consistently high	Deteriorating or consistently low
Payment	The steady growth corresponds to the complexity and working conditions, pay levels is comparable to or greater than this value in other industries	Payment is significantly lower than in other industries, it has minimal growth rate
Staff reproduction	Demand for engineering jobs is growing, interaction between higher educational establishments and enterprises is established	Demand for engineering professions is falling, links between universities and enterprises are collapsing or missing

"↑" – increase of values or increase of factor impact that is directly dependent on the development of PQC; "↓" – reduction of values, weakening of the influence; "⟶" – increase in value or enhance in characteristics factor, which indirectly affects the change; "⟵" – reduction of values, weakening of the influence; "⟵" – stable factor state. That is, $f_i \in$ {"↑", "↓", "⟶", "⟵", "⟶"}, where i – state index.

For each situation the state of the factors that lead to optimistic and pessimistic scenarios are defined. The actual factors state (type f_i for F_i) is compared with PQC state development (type f_i for a_i. The result of comparison is marked with β, which takes the values 0 and 1, where 1 is for the coincidence of states. The value of β is multiplied by the factor value (marked by nF_i) and -1 for the pessimistic scenario. The factor value is selected taking into account the degree of influence on PCR and priorities for their regulation.

The situations in the table are divided into three groups: best ("A"), conditionally valid ("B", "C"), invalid ("D", "E", "F", "G", "H", "I"). Group factor (K_i) is calculated by multiplying the proportion of situations in group by 1/9 (the proportion of the total number of situations). The final grade is obtained by multiplying the total points by the group factor. The estimate of the situations in which there are several options that lead to optimistic and pessimistic scenarios is calculated by averaging the total points according to these options. The positive value of the total estimate reflects optimistic PQC development, negative one, on the contrary, as far as the pessimistic character of development is inherent in the actual state of the factors. Thus, the total estimate of the impact of factors of external and internal environment quantitatively determines the extent of the current PQC situation compliance to one of the PQC scenarios.

Conclusions. Thus, solving the task of choosing a method of forecasting the CSR formation allows achieving the following results. Firstly, the choice of scenario forecast as the most effective method of professional qualification evaluation in the enterprise labor market enterprises under conditions of partial uncertainty of external socio- economic environment is grounded. Secondly, the external factors that influence the structure of employee's qualities compliance to the employer's interests, which are the basis for the forecast scenario, are selected. Thirdly, two forecast directions, optimistic and pessimistic, are identified. According to them the direction of PQC development is estimated. Fourthly, based on factors and situations connection the method of assessing PQC is suggested according to the contingency table. This allows determining the vector of forming social responsibility of employees in engineering enterprise, and, thus, developing a set of measures to improve it.

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Table 2

PQC scenario determination

Situation	Scenario										Total point	Group factor	Final estimate
	optimistic					pessimistic							
	Factor												
	F_1	F_2	F_3	F_4	F_5	F_1	F_2	F_3	F_4	F_5			
α_1	$nF_1 * b$	...	...	...	$nF_5 * b$	$-nF_1 * b$	...	...	...	$-nF_5 * b$	$\sum(\pm nF_i * b)$	K_i	$\sum(\pm nF_i * b) * K_i$
...	...	...	...	...	...	...	...	...	...	...	...	...	...
α_9	$nF_1 * b$	...	...	...	$nF_5 * b$	$-nF_1 * b$	...	...	...	$-nF_5 * b$	$\sum(\pm nF_i * b)$	K_i	$\sum(\pm nF_i * b) * K_i$
Total estimate													$\sum\sum(\pm nF_i * b) * K_i$

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Кляус Д. П. Метод прогнозування формування соціальної відповідальності персоналу машинобудівних підприємств

У статті з'ясовано зміст сценарного методу прогнозування формування соціальної відповідальності персоналу машинобудівних підприємств. Визначено зовнішні та внутрішні чинники, що впливають на рівень професійно-кваліфікаційної відповідності. Наведено методику визначення вектору розвитку соціальної відповідальності персоналу.

Ключові слова: соціальна відповідальність бізнесу, професійно-кваліфікаційна відповідність, машинобудування, сценарний прогноз, таблиці спряженості.

Кляус Д. П. Метод прогнозирования формирования социальной ответственности персонала машиностроительных предприятий

В статье выяснено содержание сценарного метода прогнозирования формирования социальной ответственности персонала машиностроительных предприятий. Определены внешние и внутренние факторы, которые влияют на уровень профессионально-квалификационного соответствия. Представлена методика определения вектора развития социальной ответственности персонала.

Ключевые слова: социальная ответственность бизнеса, профессионально-квалификационное соответствие, машиностроение, сценарный прогноз, таблицы сопряженности.

Klyaus D. P. Method of Prognostication of Forming of Social Responsibility of Personnel of machine-building enterprises

Maintenance of scenario method of prognostication of forming of social responsibility of personnel of machine-building enterprises is found out. External and internal factors which influence on the level of professionally-qualifying accordance are certain. The method of determination of vector of social responsibility of personnel development is presented.

Key words: social responsibility of business, professionally-qualifying accordance, engineer, scenario prognosis, tables of attended.