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# MODEL OF REALIZATION OF MECHANISM OF ENTERPRISE CORPORATE CULTURE FORMATION

## ABSTRACT

The article develops and substantiates a model for implementing the mechanism for building the corporate culture of enterprise. A number of factors influencing the formation of the corporate culture of enterprise have been identified and proved, and the cause-and-effect relationships of the influence of the studied factors on the construction of corporate culture have been studied. These factors are incorporated into the cognitive model and their cause-and-effect relationships are established. The influence of each factor on the resulting indicator is determined and it is found that the greatest direct impact on the corporate culture is exerted by the structure of personnel, non-productive losses of working time (absenteeism) and the consciousness of human capital, and the reverse impact on the target top is exerted by two factors, namely: the degree of resistance of human capital to changes and corporate and functional strategies of the enterprise; All other factors of the model have a direct indirect impact on the target indicator of the model. The degree of balance of the proposed cognitive model of corporate culture building is estimated. It is established that this system is unbalanced which indicates the existence of interaction between the factors that affect the corporate culture and that are included in the proposed cognitive model. The practical implementation of the developed cognitive model made possible the development and studying of scenarios to build a corporate culture.

**Keywords:** corporate culture, machine-building enterprise, assessment, cognitive model, development strategy, system balance

**JEL Classification:** B49

## INTRODUCTION

The competitiveness of the enterprise largely depends on the available labour, production and technological resources. Corporate culture has an influence on the effective use of labour resources and the increase of productivity. Its level, the specifics of the formation, development, methods and approaches to implementation determine the degree of efficiency for the team and, accordingly, for the enterprise as a whole. The system of rules and standards that regulate the interaction of staff with various structural units of the enterprise and governing bodies is one of the key factors for successful development. The task of corporate culture building at the enterprise is poorly structured and is characterized by a variety of processes that cannot be analyzed on the basis of quantitative information. One of the effective tools for the study of poorly structured systems is cognitive modelling. It is possible to use cognitive modelling methods to determine the degree of influence of various factors on the resulting indicator. Also, this method includes elements of processes self-organization in the studied system, allows to develop scenarios of system development options and to increase the efficiency of solving the assigned task [1]. Formally, the cognitive model is usually represented as a sign graph. The use of the sign graph (cognitive model) as a model of complex systems is based on the following idea. The most important factors for the assigned test are considered to be the vertices of the graph. From the variable  $u$  to the variable  $v$  the corresponding arc is made, if the change of  $u$  affects  $v$ . That is, cause-effect relations are represented as arcs that characterize the influence of factors among themselves. This arc has a plus sign if the effect is "amplifying" (i.e., other things being

equal, an increase in  $u$  leads to an increase in  $v$  or a decrease in  $u$  leads to a decrease in  $v$ ), a minus sign if the effect causes "inhibition" (other things being equal, an increase of  $u$  leads to decrease of  $v$  or decrease of  $u$  leads to increase of  $v$ ). Cognitive modelling makes it possible to identify the structure of the problem, and the most significant factors and assess their interaction. Also, based on the cognitive model, it is possible to develop scenarios for the development of the studied process under the influence of selected factors (impulse process). Therefore, the aim of the article is to formalize the model of realization of the mechanism of corporate culture building of machine-building enterprises on the basis of the application of cognitive modelling.

## LITERATURE REVIEW

Considerable attention is paid to the problems of formation, evaluation and development of corporate culture in the works of domestic and foreign scientists. Thus, Professor M. Hilb [2, p. 616; 14] presented a "new concept of corporate governance", O.A. Harun. Stetsyuk O.V. and others explore the principles of corporate culture process management [3]. D. Johnson and K. Scholes identified six main elements of corporate culture, which should be used to diagnose an enterprise [4]: 1) history; 2) rituals and subroutines; 3) symbols; 4) organizational structure; 5) control system; 6) law enforcement agencies.

However, in foreign literature, other methods of diagnosing corporate culture are widely used. Thus, Denison D.R. in his methodology "DOCS" (English. Denison Organizational Culture Survey) emphasizes that the methodology "DOCS" provides an opportunity to get a general assessment of the level of corporate culture and its components [5].

R. Goffee and G. Johnson have developed the "Double S Cube" model, according to which the diagnostics of the corporate culture of the enterprise is carried out according to two parameters [6]: sociality (characterizes the tendency of employees to have friendly relations with each other) and solidarity (indicates the tendency of the staff to combine their thoughts). In the authors' research: Dyakiv O.P. [7], Hailin Zhao, Haimeng Teng and Qiang Wu [8], Voynarenko M.P. [9], Cherep O.H. [9], Gonchar, O. [9], Cherep A.V. [9, 11], Gritsenko N.V. [10], Gudz P.V. [11], Ileva-Naydenova P.P. [11], Oleinikova L.H. [11], Kolesnikov A.V. [12], Lifintsev D.S. [13], Novgorodova L.G. and Mikhailova A.V. [14], Nel P.S., Van Dyke P.S., Haasbroek G.D., Sono T. and Werner A. [15], Naranjo-Valencia J.C., Jimenez-Jimenez D., Sanz-Valle R. [16], Oliynyk T.I. and Kryvytska N.V. [17], Petrova, I.L. [18], Shapoval O.A. [19], Zelich V.V. [20], and others, the essence of corporate culture, approaches to evaluation (from the standpoint of typology), factors influencing corporate culture (their features) are disclosed, individual components of corporate culture are studied, etc. However, not a single author has studied the problem of the mechanism of formation of corporate culture with multiple scenarios of its development.

## AIMS AND OBJECTIVES

The aim of the work was to develop and substantiate a cognitive model for implementing the mechanism for the formation of the corporate culture of enterprise.

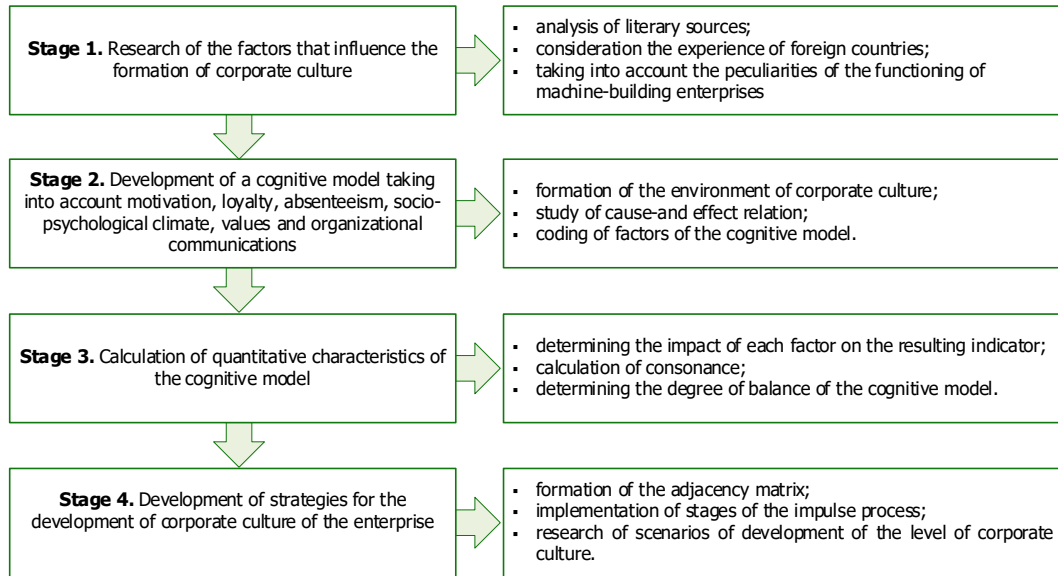
In order to achieve this goal, we have solved a number of tasks, namely: we have identified a number of factors influencing the formation of corporate culture and substantiated their cause-and-effect relationships. The influence of each factor on the resulting indicator has been determined, the consonance has been calculated and the degree of balance of the proposed system for implementing the mechanism for the formation of corporate culture has been evaluated. On the basis of the developed cognitive model, nine scenarios for the development of the level of corporate culture have been formed.

## METHODS

The cognitive approach considers corporate culture through certain norms of behaviour, certain rules, knowledge, traditions and habits. Corporate culture is managed on the basis of various trainings and seminars aimed at forming a corporate spirit, which contributes to the achievement of the main goals of the enterprise. The building of corporate culture in the enterprise should be described by constructing a sign graph, i.e. using a cognitive model. In which the vertices, which are represented by a set of factors  $u_1, u_2, \dots, u_n$  and take the value of  $v_i(t)$  at discrete moments of time  $t = 0, 1, 2, \dots$ , and correspond to the main structural elements of the studied system and managed by cause-and-effect relations denoted by arcs.

The authors propose a sequence of stages of development of the environment for the formation of the corporate culture of the enterprise and strategies for its development (Figure. 1). All these stages are interconnected and follow each other.

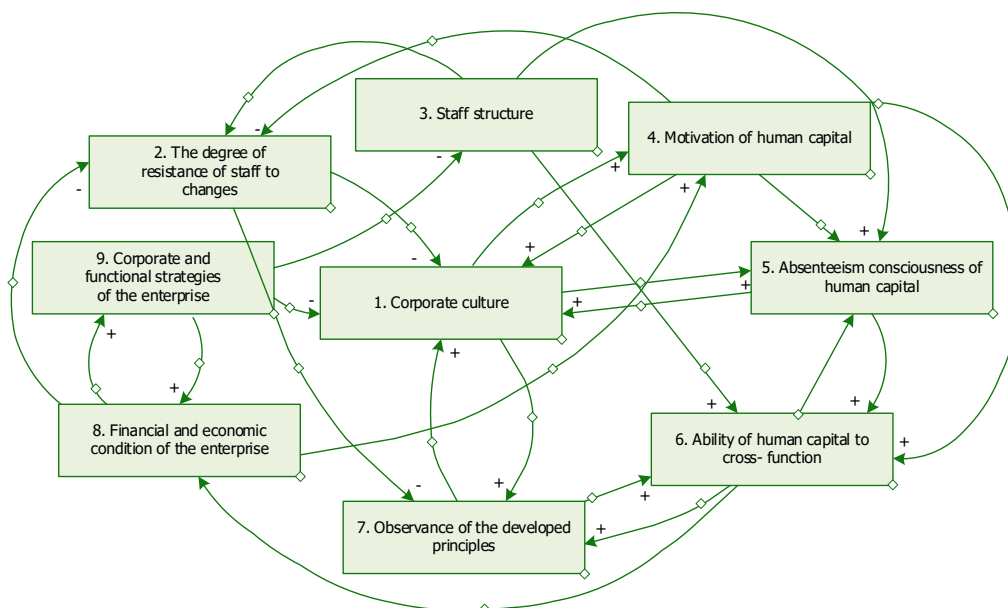
Implementation of the proposed mechanism will allow to form and explore many scenarios for the development of a corporate culture of the business entity.



**Figure 1. Development of the mechanism of the environment of corporate culture building and development scenarios.**

According to Figure 1, at the first stage of development of the environment for corporate culture building, information sources on the research topic were analyzed, and they allowed to determine the factors that influence the formation of corporate culture. The main factors are the following: the degree of resistance of human capital to change, i.e. the loyalty of employees to the proposed measures; staff structure (age, professional, qualification); motivation of human capital (bonuses, corporate events, social development) and, accordingly, motivation for intellectual development (refresher training, training, seminars); absenteeism and consciousness of human capital (personal, collective consciousness of staff, behavioural, attitude to work, emotional and volitional component); the ability of human capital to cross-function; compliance with the developed corporate principles (rules, standards) and values of the enterprise; financial and economic condition of the enterprise; corporate and functional strategies of the enterprise.

Figure 2 shows a directed graph of the cognitive model, the environment for the formation of the corporate culture. The developed model includes a number of interaction factors, and forms and defines the contours of interaction that need to be investigated.



**Figure 2. The environment for the corporate culture building.** (Source: built by the authors)

Cause-effect relations of the influence of the studied factors to build a corporate culture are formed on the basis of the following assumptions (dependencies):

- the business entity forms a corporate culture on the basis of the personal and collective consciousness of staff, as well as compliance with the principles of work implemented by them, taking into account the functional strategies of human capital management and internal communications and PR;
- the motivation of staff has a positive influence on the corporate culture of the business entity, as well as their attitude to work and a favourable emotional ambience in the team;
- increasing the degree of resistance of staff to the implemented developed principles of work reduces the level of corporate culture;
- in the case when the functional strategy of human resources management does not correspond to the directions of the business strategy of the enterprise, the level of corporate culture in this case decreases, so we should not forget about mechanisms that would contribute to human capital development and optimization of enterprise resources;
- increasing the level of awareness of human capital helps to reduce the level of absenteeism, which in turn encourages more coordinated work in a team or project team, thereby disciplining staff in accordance with developed rules and standards and has a positive impact on increasing corporate culture;
- improving the financial condition of the enterprise makes it possible to implement mechanisms that would increase the motivation of staff and reduce their resistance to the proposed changes in work;
- optimization of staff structure, i.e. improving the level of professionalism and skills of human capital through their participation in training and seminars that will contribute to their intellectual development also has a positive effect on the level of corporate culture of the enterprise.

## RESULTS

A number of the above factors are specific to the formation of the corporate culture of domestic enterprises and forms of interaction within an individual business entity through cooperation, understanding and conflict. In a corporate environment, a conflict can be defined as a conflict or intersection of interests of interacting personnel during business activities. Corporate conflict is characterized by steadiness, and dynamism and is limited by the level of personal and collective consciousness of human capital of an individual enterprise. Therefore, the proposed cognitive model is formed on the principles of motivation, loyalty, absenteeism, socio-psychological climate, values and organizational communications of industrial enterprises.

To simplify the presentation and understanding of information, we encode each factor of the constructed digraph (Table 1). In the future, during the calculations, we will use the code of the factor instead of its denomination.

In order to determine the influence of each factor on the resulting indicator, we analyze the generalized digraph of the environment of the building of the corporate culture of the production enterprise. The resulting indicator is the target vertex of the digraph "Corporate Culture".

Table 1. Coding of cognitive model factors.		
Nº	Factor name	Vertex code $v_i$
1	Corporate culture	$v_1$
2	The degree of resistance of staff to changes	$v_2$
3	Staff structure	$v_3$
4	Motivation of human capital	$v_4$
5	Absenteeism and consciousness of human capital	$v_5$
6	The ability of human capital to cross-function	$v_6$
7	Observance of the developed principles	$v_7$
8	Financial and economic condition of the enterprise	$v_8$
9	Corporate and functional strategies of the enterprise	$v_9$

To do this, we define the existing paths through which you can get to the vertex  $v_1$  with the direct and inverse effects (Table 2).

**Table 2. Definition of the total impact of the analyzed factors on the level of corporate culture.**

№	Possible paths	Factor total impact	
		Paths with a direct impact	Paths with an inverse impact
1	From vertex $v_2$ to vertex $v_1$	Paths with a direct impact	$a_{21} = \frac{1}{5} + \frac{1}{6} = 0,367$
		Paths with an inverse impact	$b_{21} = 1 + \frac{1}{2} + \frac{1}{4} = 1,75$
2	From vertex $v_3$ to vertex $v_1$	Paths with a direct impact	$a_{31} = \frac{2}{2} + \frac{3}{3} + \frac{3}{4} + \frac{3}{5} + \frac{2}{6} + \frac{1}{7} = 3,83$
		Paths with an inverse impact	$b_{31} = \frac{1}{4} + \frac{1}{5} + \frac{1}{6} = 0,62$
3	From vertex $v_4$ to vertex $v_1$	Paths with a direct impact	$a_{41} = \frac{2}{2} + \frac{3}{3} + \frac{2}{4} + \frac{3}{5} + \frac{1}{6} = 3,27$
		Paths with an inverse impact	$b_{41} = \frac{1}{4} + \frac{1}{5} + \frac{3}{6} + \frac{1}{7} + \frac{1}{8} = 1,22$
4	From vertex $v_5$ to vertex $v_1$	Paths with a direct impact	$a_{51} = 1 + \frac{1}{3} + \frac{2}{4} + \frac{2}{5} + \frac{1}{6} = 2,4$
		Paths with an inverse impact	$b_{51} = \frac{1}{4} + \frac{1}{6} + \frac{1}{7} = 0,56$
5	From vertex $v_6$ to vertex $v_1$	Paths with a direct impact	$a_{61} = \frac{2}{2} + \frac{1}{3} + \frac{1}{4} = 1,58$
		Paths with an inverse impact	$b_{61} = \frac{1}{3} + \frac{2}{5} + \frac{1}{6} + \frac{1}{7} = 1,04$
6	From vertex $v_7$ to vertex $v_1$	Paths with a direct impact	$a_{71} = 1 + \frac{1}{3} + \frac{2}{4} + \frac{2}{5} = 2,23$
		Paths with an inverse impact	$b_{71} = \frac{1}{4} + \frac{2}{6} = 0,58$
7	From vertex $v_8$ to vertex $v_1$	Paths with a direct impact	$a_{81} = \frac{2}{2} + \frac{3}{3} + \frac{2}{4} + \frac{2}{5} = 2,9$
		Paths with an inverse impact	$b_{81} = \frac{1}{2} + \frac{2}{4} + \frac{3}{5} + \frac{1}{7} = 1,74$
8	From vertex $v_9$ to vertex $v_1$	Paths with a direct impact	$a_{91} = \frac{2}{3} + \frac{3}{4} + \frac{2}{5} + \frac{2}{6} + \frac{1}{7} = 2,3$
		Paths with an inverse impact	$b_{91} = 1 + \frac{2}{3} + \frac{3}{4} + \frac{3}{5} + \frac{3}{6} + \frac{1}{7} + \frac{1}{8} = 3,78$

Then we determine the total effect of factor  $v_i$  on factor  $v_j$ , it is the following:  $a_{ij} = \sum_{i,j=1}^n \frac{1}{k}$ , where  $n$  is the number of possible paths,  $k$  is the path length. The total inverse effect of factor  $v_i$  on factor  $v_j$  is determined similarly [10]:  $b_{ij} = \sum_{i,j=1}^n \frac{1}{k}$ .

The final mutual influence of factors on each other is calculated as follows:

$$p_{ij} = a_{ij} + b_{ij} \quad (1)$$

where  $a_{ij}$  is the positive effect of factor  $i$  on  $j$ ;  $b_{ij}$  is the negative influence of factor  $i$  on  $j$ .

Based on the matrix of the final interaction, the system indicators of the cognitive map are calculated, such as the influence of the concept on the system (consonance), and the influence of the system on the concept (dissonance). Consonance (level of confidence) determines how consistent the presence of a factor in the model is (a measure of the difference

between positive and negative influences). The consonance index expresses the degree of confidence in the factor and strength of influence (the higher the consonance is, the more convincing the opinion). That is, the higher the degree of consonance of factors with the system and the system with factors, its relationship with other factors, its impact on the resulting indicator is tested and is based on real reasons [1]. The consonance of the influence of factor  $i$  on  $j$  is determined using the following formula:

$$c_{ij} = \frac{a_{ij} - b_{ij}}{a_{ij} + b_{ij}} \quad (2)$$

The greater the value of consonance is, the more convincing the idea of the sign of action, i.e. there is more confidence in the results. Dissonance is defined as a fuzzy complement of consonance:  $d = 1 - c$  and determines how reasoned is the influence of the system on each of the factors. The results of the consonance calculation are shown in Table 3.

Table 3. Determining the level of influence of cognitive model factors.				
Nº	Possible paths	Final mutual impact of factors	Consonant	Conclusion
1	$v_2 \rightarrow v_1$	$P_{21} = 2,117$	$c_{21} = \frac{0,367 - 1,75}{0,367 + 1,75} = -0,65$	An increase in change resistance of the staff will reduce the level of the corporate culture of the enterprise
2	$v_3 \rightarrow v_1$	$P_{31} = 4,44$	$c_{31} = \frac{3,83 - 0,62}{3,83 + 0,62} = 0,72$	Optimization of age, professional and qualification structure of staff has a positive effect on the level of corporate culture of the business entity
3	$v_4 \rightarrow v_1$	$P_{41} = 4,48$	$c_{41} = \frac{3,27 - 1,22}{3,27 + 1,22} = 0,46$	The rise of the level of human capital motivation has a positive effect on the level of the corporate culture of the enterprise
4	$v_5 \rightarrow v_1$	$P_{51} = 2,96$	$c_{51} = \frac{2,4 - 0,59}{2,4 + 0,59} = 0,62$	The rise of the level of personal and collective consciousness of human capital (i.e. reducing the level of absenteeism) contributes to the growth of the corporate culture of the enterprise
5	$v_6 \rightarrow v_1$	$P_{61} = 2,62$	$c_{61} = \frac{1,58 - 1,04}{1,58 + 1,04} = 0,22$	Subject to clear coordinated work of human capital of the enterprise in a team, the level of corporate culture grows
6	$v_7 \rightarrow v_1$	$P_{71} = 2,82$	$c_{71} = \frac{2,23 - 0,58}{2,23 + 0,58} = 0,59$	Compliance with the rules and principles developed by employees helps to raise the level of corporate culture
7	$v_8 \rightarrow v_1$	$P_{81} = 4,64$	$c_{81} = \frac{2,9 - 1,74}{2,9 + 1,74} = 0,25$	Improvement of the financial and economic condition of the enterprise contributes to the growth of corporate culture
8	$v_9 \rightarrow v_1$	$P_{91} = 6,08$	$c_{91} = \frac{2,3 - 3,78}{2,3 + 3,78} = -0,25$	Contradiction of the functional strategy of human resources management with the directions of business strategy development leads to a decrease in the level of corporate culture

As a result of determining the consonance, the influence of each factor included in the cognitive model was established. Thus, the greatest direct impact on the target vertex is exerted by factor  $v_3$  (staff structure) and factor  $v_5$  (absenteeism and human capital consciousness) for which the value of consonance is 0,72 and 0,62, respectively. The inverse effect on the target vertex is exerted by two factors, namely factor  $v_2$  (the degree of resistance of human capital to change) and factor  $v_9$  (corporate and functional strategies of the enterprise). All other factors of the model have a direct mediate effect on the target index of the model.

According to Figure 1 the next step is to determine the degree of balance of the cognitive model. The degree of balance  $b(G)$  is calculated on the basis of the definition of the ratio between the number of positive contours of the formed digraph to their total number under the conditions that  $b(G) \in [0; 1]$ . In the case when  $b(G)=0$ , the digraph is balanced, if  $b(G)=1$ , it is unbalanced [17].

Figure 2 shows that the constructed digraph has 128 contours, 71 of them are contouring and 57 are stabilizing. Since the obtained contours have different lengths, the measure of relative balance is determined taking into account the length of the contours as follows: [22]

$$b(G) = \frac{\sum_{k=3}^c \frac{1}{k} p_k}{\sum_{k=3}^c \frac{1}{k} t_k} \quad (3)$$

where  $p_k$  is the number of positive cycles of length  $k$ ;  $t_k$  is the total number of cycles of length  $k$ ;  $c$  is the length of the longest cycle in the digraph  $G$ .

Then the measure of balance  $b(G)$  for the built model of formation of the corporate culture of the enterprise makes:

$$b(G) = \frac{\frac{1}{1} \cdot 3 + \frac{1}{2} \cdot 3 + \frac{1}{3} \cdot 6 + \frac{1}{4} \cdot 23 + \frac{1}{5} \cdot 18 + \frac{1}{6} \cdot 11 + \frac{1}{7} \cdot 7}{\frac{1}{1} \cdot 5 + \frac{1}{2} \cdot 3 + \frac{1}{3} \cdot 6 + \frac{1}{4} \cdot 26 + \frac{1}{5} \cdot 38 + \frac{1}{6} \cdot 18 + \frac{1}{7} \cdot 21 + \frac{1}{8} \cdot 10 + \frac{1}{9} \cdot 1} = \frac{18,68}{29,96} = 0,624.$$

Therefore, the developed cognitive model is unbalanced, because  $b(G) > 0.5$ , but this does not mean that the current situation is negative because such an understanding of balance implies a limited increase in the values of the parameters of the vertices of the system. The obtained value of balance 0,624 indicates that the current situation is more or less effective, i.e. there is an interaction between the vertices of the constructed digraph.

Having determined the degree of balance, we proceed to the next stage and construct a contiguity matrix  $AG = A = |\alpha_{ij_{n \times n}}|$  under the following conditions [22]:

$$\text{sgn}(u_j, u_i) = \begin{cases} 1, & \text{if the edge } (u_j, u_i) \text{ is positive,} \\ -1, & \text{if the edge } (u_j, u_i) \text{ is negative,} \\ 0, & \text{if the edge } (u_j, u_i) \text{ is missing.} \end{cases} \quad (4)$$

Table 4 shows that the adjacency matrix, which is constructed in accordance with the constructed digraph and condition (4), in which the sign "+1" indicates a positive relationship between the vertices, the sign "-1" is a negative relationship, the sign "0" is a lack of connection between vertices (model factors). The contiguity matrix is not symmetric, as the factors do not necessarily have to be interrelated.

**Table 4. Adjacency matrix.**

Vertices (model factors)	v <sub>1</sub>	v <sub>2</sub>	v <sub>3</sub>	v <sub>4</sub>	v <sub>5</sub>	v <sub>6</sub>	v <sub>7</sub>	v <sub>8</sub>	v <sub>9</sub>
v <sub>1</sub>	0	0	0	1	1	0	1	0	0
v <sub>2</sub>	-1	0	0	0	0	0	-1	0	0
v <sub>3</sub>	0	-1	0	0	1	1	0	0	0
v <sub>4</sub>	1	-1	0	0	1	1	0	0	0
v <sub>5</sub>	1	0	0	0	0	1	0	0	0
v <sub>6</sub>	0	0	0	0	1	0	1	1	0
v <sub>7</sub>	1	0	0	0	0	1	0	0	0
v <sub>8</sub>	0	-1	0	-1	0	0	0	0	1
v <sub>9</sub>	-1	0	-1	0	0	0	0	1	0

The study of the autonomous impulse process is based on the following rule [22]:

$$v_i(t + 1) = v_i(t) + \sum_{j=1}^n \text{sgn}(u_j, u_i) p_j(t), \quad (5)$$

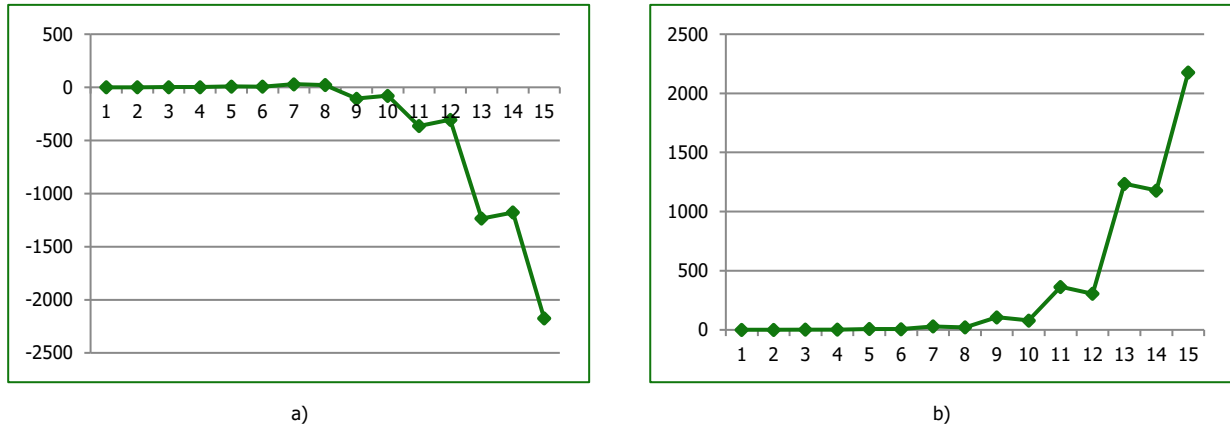
where  $v_i(t)$  is the magnitude of the impulse in the  $i$ -th vertex at the previous moment (simulation cycle);  $v_i(n + 1)$  - the magnitude of the impulse in the  $i$ -th vertex at a certain time for the researcher ( $n + 1$ );  $p_i(n)$  is the vector of perturbations and control influences entering the vertex and at the moment ( $n$ ).

To implement the impulse process, we will gradually launch a disturbing impulse to the vertices of the constructed digraph, as a result, we will get possible scenarios for the development of the target vertex ( $v_i$ ), which will identify factors influencing the level of corporate culture of the entity.

As a result of our calculations, we obtained many scenarios for the development of the level of corporate culture.

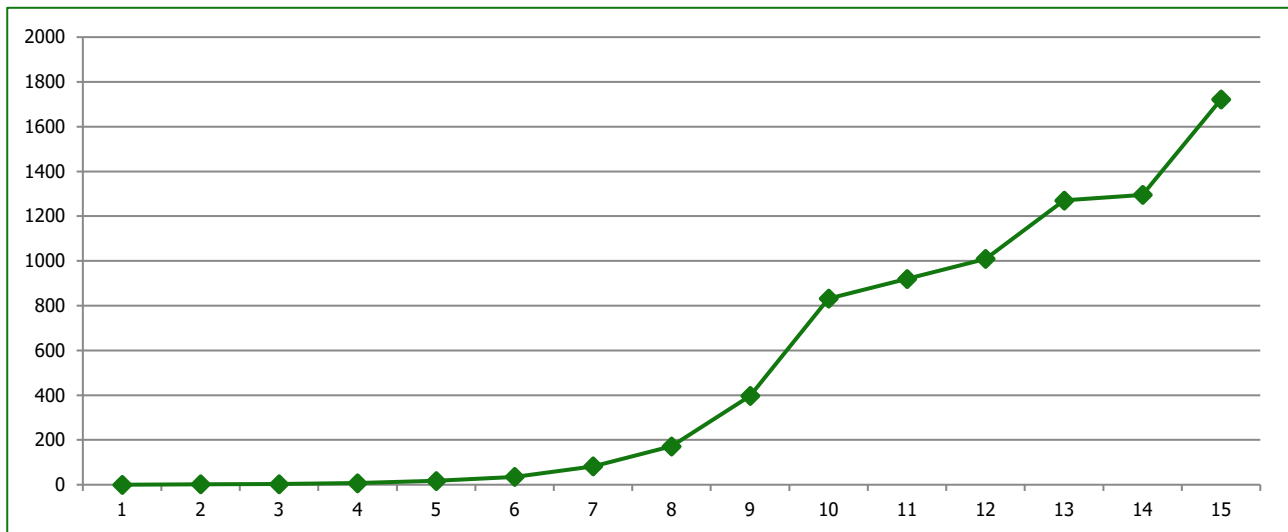
*Scenario 1.* The disturbing impulse is given to vertex 2 (the degree of resistance of the staff to changes). Positive impulse -  $\text{imp}_2(t) = (0, 1, 0, 0, 0, 0, 0, 0, 0)$  (Figure 3a), negative impulse -  $\text{imp}_2(t) = (0, -1, 0, 0, 0, 0, 0, 0, 0)$  (Figure 3b). As a result of a positive impulse, there is a significant decrease in the indicator from the 12th period, and in the case of a negative impulse, the dynamics of the indicator change are reversed, i.e. there is an increase from the 10th period.

So, we can say that if the staff is loyal to internal corporate changes and follows all the developed rules, the level of corporate culture in the company will improve over time. However, it should be noted that in the team there may be isolated cases of disagreement with the proposed changes, so in Figure 3b there is a growing of oscillating process. With the growth of staff resistance to the developed corporate rules (Figure 3b), i.e. any changes, the level of corporate culture will decrease. That is, this is explained by the fact that any changes in the rules condition the opportunistic behavior of staff, and as a result a lowering of the level of corporate culture.



**Figure 3. Scenario of the change of the level of corporate culture in the formation of the resistance degree of the staff.**

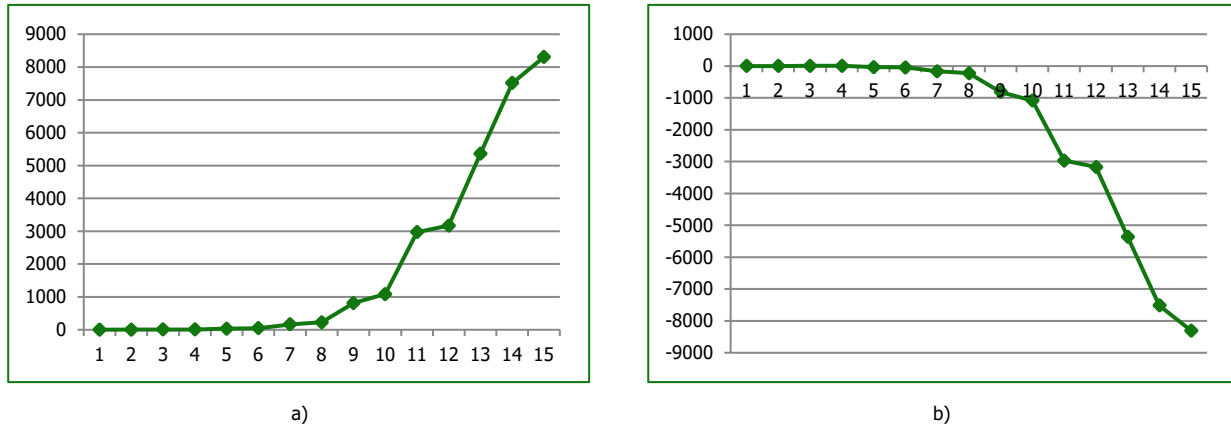
*Scenario 2.* The initial impulse is fed to the vertex  $v_3$  (personnel structure), (Figure 4).



**Figure 4. Scenario of changes in the level of corporate culture under the condition of optimization of the structure of human capital.**

Optimization of the personnel structure involves, first of all, diagnostics of employees for compliance of professional qualifications with the position occupied by the employee. The next stage is a quantitative and qualitative analysis of the staff, which involves a study of the number and qualitative characteristics of employees. After a thorough analysis, it is necessary to develop a program for improving the personnel structure by improving the qualification and professional component of human capital. Therefore, the optimization of the structure of human capital involves the implementation of a set of measures that reflect the priorities of the enterprise in terms of the quality composition of personnel. This approach ensures that the structure of human capital meets the current requirements of a modern enterprise. At the same time, the dynamics of the level of corporate culture are growing, which stabilizes the work of the business entity as a whole.

*Scenario 3.* The initial positive impulse is given to the vertex  $v_4$  (human capital motivation),  $imp_4(t) = (0,0,0,1,0,0,0,0,0)$  (Figure 5a), the negative impulse - (Figure 5b).



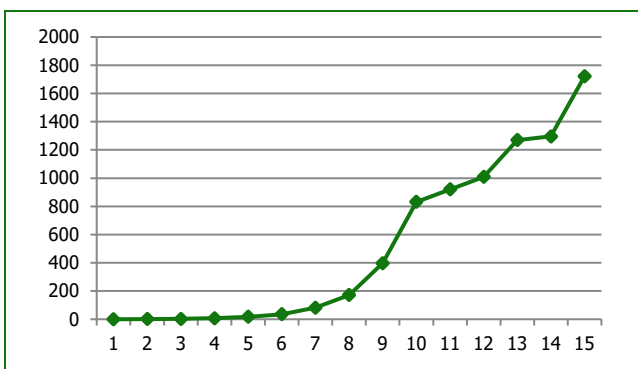
**Figure 5. Scenario of changing the level of corporate culture under the terms of a change in the motivation of human capital.**

The issue of motivation of human capital in the developed empirical system of corporate culture formation plays a crucial role. Figure 4 shows that when increasing the motivation of human capital, the level of corporate culture tends to rise (Figure 5a), and when decreasing the level of motivation, we have the opposite trend (Figure 5b).

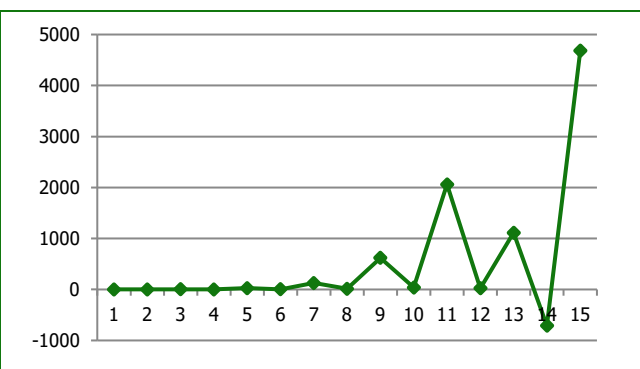
Employee motivation is one of the key factors in the success of any business. In order for every employee to have the desire to achieve the main goal of the enterprise, he must be well motivated. The effectiveness of motivation depends primarily on an employee's personal qualities and values. But also, such aspects as the psychological mood of employees and the general atmosphere in the enterprise are important. The friendly attitude of the management to the active initiative workers promotes their self-realization and increases the level of their personal motivation. Therefore, in the formation of the corporate culture of the enterprise it should be considered modern approaches to human resource management in order to make the productivity of each employee more efficient.

*Scenario 4.* The initial impulse is fed to the vertex  $v_3$  (staff structure),  $imp_3(t) = (0,0,1,0,0,0,0,0)$  (Figure 6). First of all, the optimization of the staff structure involves the diagnosis of employees for compliance with professional qualifications for the position held by the employee. The next stage is a quantitative and qualitative analysis of staff which involves a study of a number of employees and their qualitative characteristics. After a thorough analysis, it is necessary to develop a program to perfect the staff structure by improving the skills and professional constituents of the human capital. Therefore, the optimization of the structure of human capital involves the implementation of a set of measures that reflect the priorities of the enterprise in terms of quality staff. This approach ensures that the structure of human capital meets the current requirements of a modern enterprise. At the same time, the dynamics of the level of corporate culture increase, which stabilizes the work of the business entity as a whole.

*Scenario 5.* The initial impulse is fed to the vertex  $v_5$  (human capital consciousness),  $imp_5(t) = (0,0,0,0,1,0,0,0)$  (Figure 7). As a result of impulse modelling, there is a gradual increase in corporate culture level. This is explained by the fact that during the implementation of the established rules, the staff is aware of all the responsibility for their implementation. Realizing that all the implemented changes will help to improve working conditions and their behaviour, the attitude to work creates a favourable atmosphere in the team, thus ensuring a sufficient level of corporate culture. Therefore, from the 10th period, there is a gradual increase in the target.



**Figure 6. The scenario of changing the level of corporate culture subject to optimize the human capital structure.**

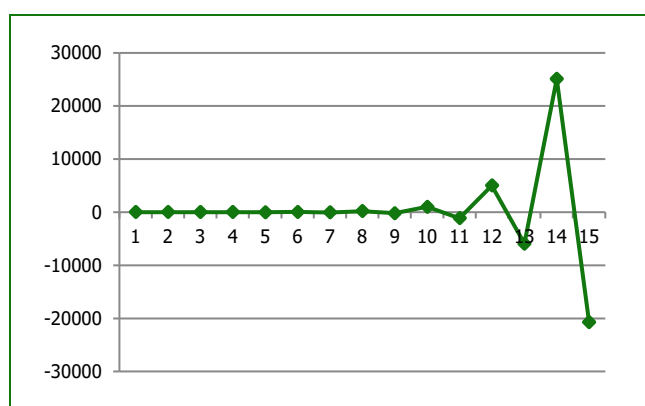


**Figure 7. The scenario of changing the level of corporate culture subject to change in the consciousness of human capital.**

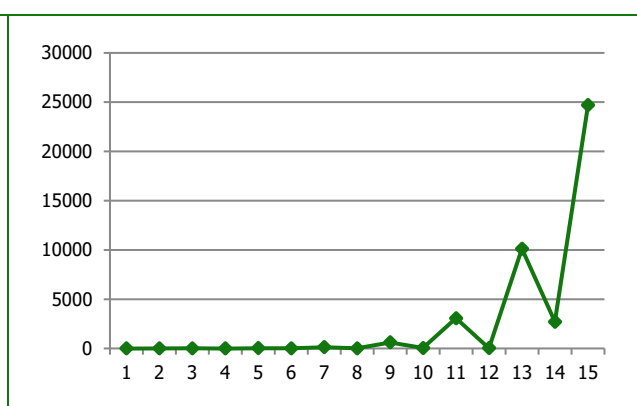
*Scenario 6.* The impulse is fed to the vertex  $v_6$  (the ability of human capital to cross-personality), (Figure 8). The ability of human capital to cross-personality involves more effective work of the individual in the team, due to teamwork and the creative potential of employees. The ability to cross-personality promotes self-development and self-organization of staff.

*Scenario 7.* The impulse is fed to the vertex  $v_7$  (staff clearly follows the developed corporative principles), i.e.  $imp_7(t) = (0,0,0,0,0,0,1,0,0)$  (Figure 9). As a result of impulse modelling, there is an oscillating growth of the target index from the 10th period. The adoption and implementation of basic standards and rules governing the activities of the enterprise and the interaction of employees and management is not always positively perceived by the team, so they must take into account not only the interests of the company but also of employees. Therefore, intensifying compliance with the developed rules, standards and principles for doing business will significantly increase the level of corporate culture.

Working together on a separate task contributes to an effective interaction of employees, and allows to learn new skills and acquire new knowledge. In such interaction, the staff acquires new competencies, which provides rapid and comprehensive interaction of employees in solving a problem. Therefore, the coordinated work of staff in the formed project groups or teams leads to an increase in the level of corporate culture. However, excessive administrative pressure from the company management leads in time to a decrease in the target indices of the model.



**Figure 8. The scenario of changing the level of corporate culture subject to the improvement of the ability of human capital to cross-personality.**

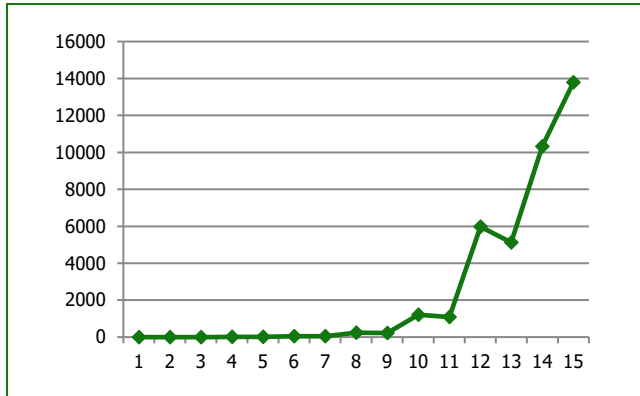


**Figure 9. The scenario of changing the level of corporate culture subject to clear implementation of the developed standards.**

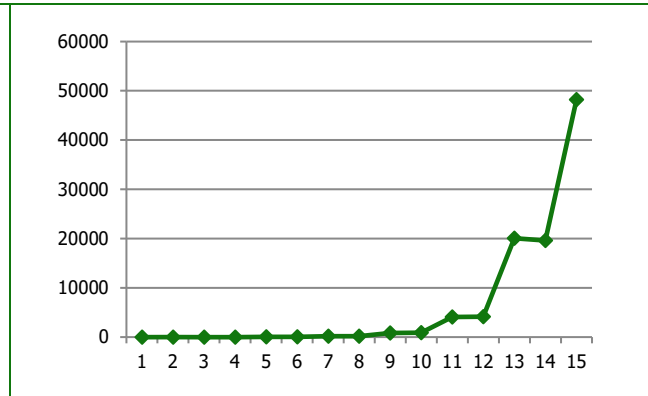
*Scenario 8.* The impulse is fed to the vertex  $v_8$  (financial and economic condition of the enterprise), i.e.  $imp_8(t) = (0,0,0,0,0,0,0,1,0)$  (Figure 10). Improving the financial and economic condition of the company gives a possibility to allocate additional funds for human capital development, namely to conduct refresher courses, and trainings and provide additional financial encouragement to all employees. Also, it is very important to constantly improve the professional level of management of the enterprise, both senior and middle management. All these measures contribute to the proper formation and improvement of corporate culture, which, in turn, depends on the efficiency of the enterprise. As can be seen from Figure 9, the implementation of this set of measures leads to a gradual increase in the target from the 10th period.

*Scenario 9.* The impulse is given to the vertex  $v_9$  (Corporate and functional strategies of the enterprise), i.e.  $imp_9(t) = (0,0,0,0,0,0,0,0,1)$  (Figure 11). The formation of corporate and functional strategies for human resource management of the enterprise should meet the business strategy of the entity. The formation of corporate culture and its development should take place synchronously with the technologies, principles, methods and norms of developing the overall strategy and tactics of the enterprise. Corporate culture in this context should become one of the components of the overall system of enterprise strategy and help it achieve its goals, thanks to its powerful internal forces.

The growing dynamics of the level of corporate culture (Figure 11) is explained by the fact that a strong corporate spirit is formed at the enterprises that are focused on creating favourable conditions for initiatives, professional development and training. Also, it is very important to meet the needs that are realized in professional activities, namely, self-realization, recognition, self-affirmation and stability. All these factors have a positive impact on the formation and development of corporate culture.



**Figure 10. The scenario of changing the level of corporate culture subject to the improvement of the financial and economic condition of the enterprise.**



**Figure 11. The scenario of changing the level of corporate culture provided that the development strategy and tactics include the mechanisms for forming the corporate spirit of employees.**

## DISCUSSION AND CONCLUSIONS

The constructed cognitive model clearly illustrates the influence of the system of factors on the level of corporate culture. The use of cognitive modeling allows to assess the current situation at the enterprise at a qualitative level and in a fairly short time. Also, by means of cognitive modelling, it is possible to analyze the interaction of the studied factors that form possible scenarios for the development of corporate culture. The use of this technology allows you to take effective management A proactive decision is not to bring the company to threatening and conflict situations. And in case of potentially dangerous situations - to make balanced and informed decisions in the interests of the business entity.

Summarizing the results obtained, the following conclusions can be drawn. The article proposes a mechanism for developing an environment for the formation of corporate culture and development strategies, which allows to form and explore many scenarios for the development of a corporate culture of the business entity. The cognitive model of realization of the mechanism of formation of corporate culture is substantiated and the influence of the analyzed factors on its level is estimated. The level of balance of the proposed cognitive model is determined and classified as unbalanced. Therefore, in the proposed model there is a limited increase in the values of the parameters of the vertices of the system. It is established that there is an interaction between the vertices of the constructed digraph and the current situation is more or less effective. Also, as a result of the implementation of the proposed cognitive model, many scenarios for the development of a corporate culture of the enterprise were obtained.

In this work, for the first time, a mechanism for developing an environment for the formation of corporate culture and a development strategy has been proposed, which allows to form and study many scenarios for the development of a corporate culture of an economic entity. For the first time, a cognitive model of implementation of the mechanism for the formation of corporate culture has been built and the influence of the analyzed factors on its level has been evaluated. The constructed cognitive model clearly illustrates the influence of the system of factors on the level of corporate culture. As a result of the implementation of the proposed cognitive model, 9 scenarios for the development of the corporate culture of enterprise have been obtained, such as:

- changes in the level of corporate culture, subject to the formation of the degree of resistance of personnel;
- changes in the level of corporate culture, subject to optimization of the structure of human capital;
- changes in the level of corporate culture, subject to changes in the motivation of human capital;
- changes in the level of corporate culture in the face of changes in the consciousness of human capital;
- changes in the level of corporate culture, provided that the ability of human capital to cross-personalize improves;
- changes in the level of corporate culture, subject to strict implementation of the developed standards;
- changes in the level of corporate culture in case of improvement of the financial and economic condition of the enterprise;
- changes in the level of corporate culture, provided that the strategy and tactics of development take into account the mechanisms for the formation of the corporate spirit of employees;
- changes in the level of corporate culture, subject to a decrease in the degree of resistance and an increase in the consciousness of the staff;

- changes in the level of corporate culture, subject to optimization of the personnel structure and improvement of human capital interaction.

The use of cognitive modeling allows to assess the current situation at the enterprise at a qualitative level and in a fairly short time.

## ADDITIONAL INFORMATION

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## МОДЕЛЬ РЕАЛІЗАЦІЇ МЕХАНІЗМУ ФОРМУВАННЯ КОРПОРАТИВНОЇ КУЛЬТУРИ ПІДПРИЄМСТВА

У дослідженні розроблено та обґрунтовано модель реалізації механізму побудови корпоративної культури підприємства. Виявлено та доведено низку факторів, що впливають на формування корпоративної культури підприємства, досліджено причинно-наслідкові зв'язки впливу досліджуваних факторів на побудову корпоративної культури. Ці фактори включаються в когнітивну модель і встановлюються їх причинно-наслідкові зв'язки. Визначено вплив кожного фактора на результуючий показник і виявлено, що найбільший безпосередній вплив на корпоративну культуру мають структура персоналу, непродуктивні втрати робочого часу (абсентеїзм) і свідомість людського капіталу, а також зворотний вплив на цільову вершину здійснюють два фактори, а саме: ступінь стійкості людського капіталу до змін та корпоративно-функціональних стратегій підприємства; всі інші фактори моделі мають прямий опосередкований вплив на цільовий показник моделі. Оцінено ступінь збалансованості запропонованої когнітивної моделі побудови корпоративної культури. Установлено, що ця система є незбалансованою, що свідчить про існування взаємодії між чинниками, які впливають на корпоративну культуру та входять до запропонованої когнітивної моделі. Практична реалізація розробленої когнітивної моделі уможливила розробку та вивчення сценаріїв побудови корпоративної культури.

**Ключові слова:** корпоративна культура, машинобудівне підприємство, оцінка, когнітивна модель, стратегія розвитку, системний баланс

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