

AUTOMATION OF EMPLOYEE EVALUATION IN EDUCATIONAL INSTITUTION

The mission statement of educational institution is considered. The business process of employee evaluation in an educational institution is investigated. Functional model of business process in the IDEF0 notation is developed. The problem statement of the evaluation task as a classification task of employee characteristics according to the degree of job correspondence is presented. An example of a job profile is shown. An algorithm for solving the problem of employee evaluation by calculating the degree of similarity is proposed.

The main mission statement of each Ukrainian educational institution is the providing of quality educational services in accordance with current Ukrainian legislation, European standards and the needs of modern Ukrainian society by improving the professional competence of the staff in the educational institution. The competence or qualification of the teaching staff should be appropriate to a job competency profile. The competencies are the employee characteristics that are important for the job effectiveness in a definite position and that can be measured through employee behavior [1]. The job profile is a document that consists of a list of competencies and functional responsibilities pertaining to a specific job, as well as a list of the employee's business and personal qualities. Thus, basis for providing of quality educational services is experienced and motivated staff. Therefore, in order to carry out the mission of the educational institution, it is necessary to evaluate the work activity of the teaching staff by time to time. To date, the employee evaluation has been resolved only by expert method, so the task of the business process automation of staff evaluation is relevant.

The first stage of automation of the existing business process is consists in TO-BE modeling. For this purpose, it is necessary to formulate the purpose of the investigated problem, to set the boundaries of the domain and the depth of detail. The process model should answer the following questions:

- Which procedures must be fulfilled for definite result and in which sequence?
- Which input documents and information each procedure use and which output documents and information the business process generate?
- Which resources are needed to implement each business process?
- Which documentation and conditions regulate the procedure?

To build a business process model of employee evaluating in the educational institution, an IDEF0 notation was selected. The context level of the business process has been created, based on IDEF0 notation (Fig. 1). The inputs for the process “conduct employee evaluation” in the educational institution are information about the staff and the job responsibilities of each position. The degree of compliance with the position is determined on the basis of the questionnaire, the job profile, the list of competencies of the educational institution and the employee evaluation method. Result allows to form personnel decisions. This process is divided into several separate functions, so to perform this business process efficiently, not only the head of the institution and the HR manager is needed, but also the IS, which will allow to automate some of the procedures.

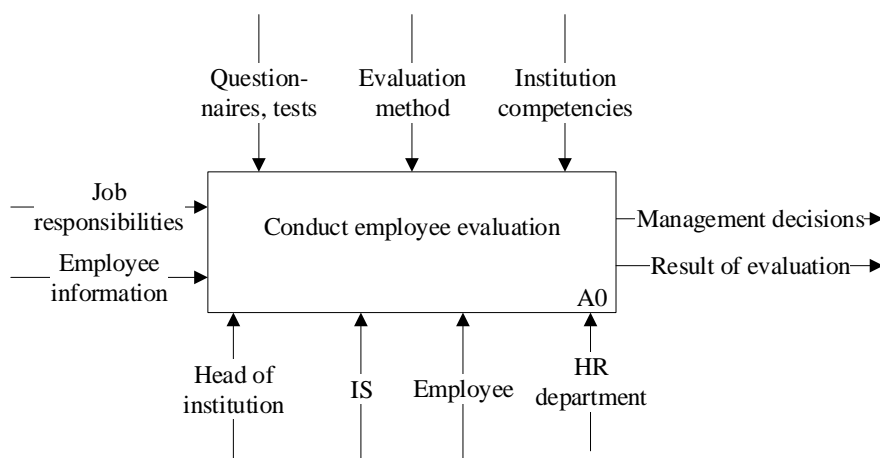


Figure 1 – Context level of evaluation process

The list of procedures for employee evaluation is presented at the next level of detail of the business process (Fig. 2).

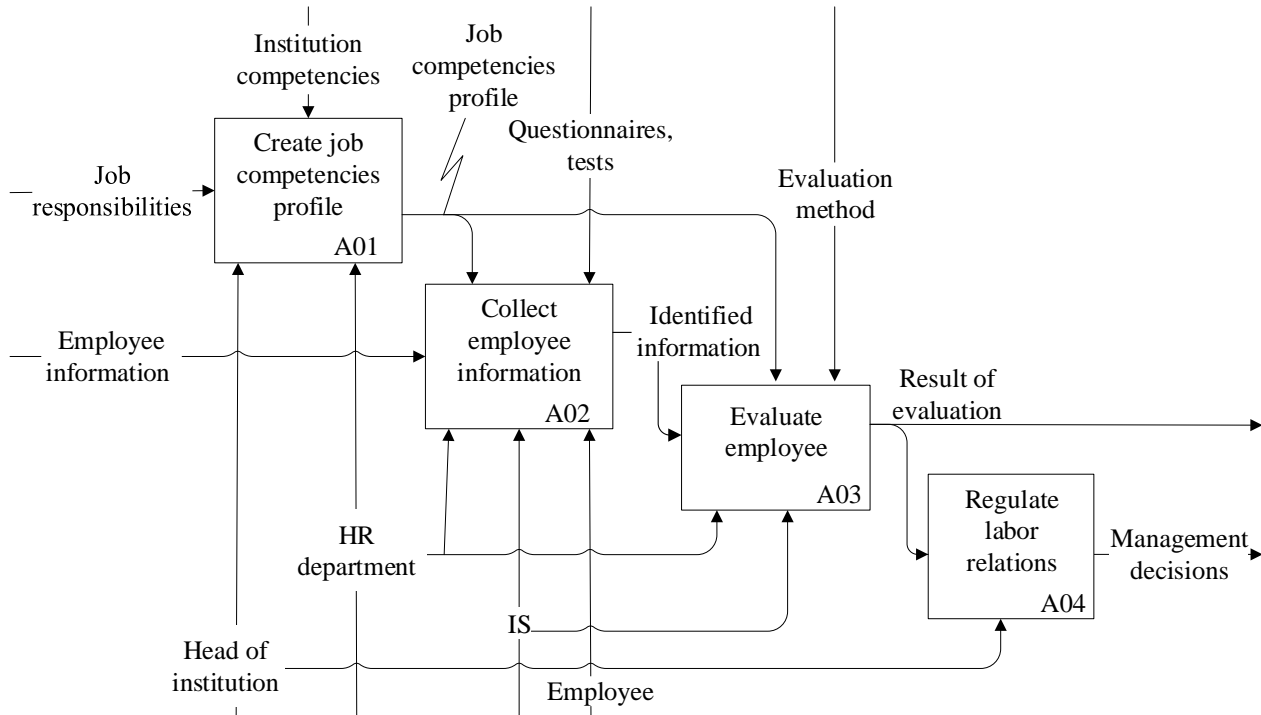


Figure 2 – Business process of employee evaluation

The employee evaluation process consists of four stages:

1 Create job competencies profile: At this stage, the head and HR-manager develop or modify the job competencies profiles as needed.

2 Collect employee information: The HR-manager collects information through questionnaires, testing, interviews, and more. Next action is the process of identifying data, which determining the values of competencies using IS.

3 Evaluate employee: The employee information is analyzed using the job competencies profile and the evaluation method. Result will help to identify the level of employee compliance.

4 Regulate labor relations: The results of the evaluation will allow the head of the educational institution to make management decisions based on his / her experience and knowledge:

- the improvement of qualification of the employee is needed;
- the involvement employee for additional activities of the institution is needed, that helps to increase the employee professionalism level;
- the possible problems in labor activity in a certain position is identified;
- the staff rotation is needed: upgrading of career ladder, demotion, salary reducing, relocation, or dismissal from employment;
- the enhancement of the level of employee motivation is needed;
- the improvement of the personnel management process as a whole is needed.

Thus, the basis for making important managerial decisions in the process of teaching staff evaluating in the educational institution is to analyze information of the employees' labor activity using the job profile. So let's look this problem in more detail.

The task of employee evaluation in educational institution is a classification task, because a certain set of employee characteristics complies or does not comply the position requirements. Therefore, the employee evaluation task can be represented in formal view: if we denote by $K=\{k_1, \dots, k_n\}$ the set of competencies for a particular position or job profile, and $P=\{p_1, \dots, p_m\}$ is a set of classes of correspondence for the position in a certain scale, then the task of evaluating a pedagogical employee is following $f:K \rightarrow P$ to find a mapping of one set to another.

The job competencies profile is a set of data with different nature (see Table 1), so it is necessary to choose an approach that allows both qualitative and quantitative data to be processed. Some competencies from job profile make a positive contribution to the final assessment of conformity, for example, the ability to speak in public, while others are negative, such as the presence of conflict situations in lessons.

Table 1 – The snippet of teacher profile in educational institution

№	Competencies and characteristics	The value of competencies and characteristics
1	The communication	Dichotomous value: yes or no
2	Ability to quickly connect with strangers	Dichotomous value: yes or no
3	Ability of public speech	Values relative to the scale: from 1 to 5
4	Well delivered and competent language	Dichotomous value: yes or no
5	Competency “Working with pupils”	This competence contains 4 levels: 1: Able to find a common ground with the pupils, but doesn’t know how to behave in conflicting situations with the pupils. 2: Acts strictly within established limits. He uses the institution’s administration to resolve conflicts. 3: Confident teacher. Able to influence the class, can manage students with deviant behavior. 4: Able to negotiate with pupils. May act as a mentor to pupils. Has respect among pupils.
6	Position experience	Number of years

To solve this classification task, it is proposed to use cluster analysis based on the calculation of the degree of similarity between the objects where the degree of relevance of the position serves as a cluster. The most popular measures of similarity for data of mixed nature are the Gower coefficient, the Zhuravlev, Voronin, and Mirkin measures. They provide the possibility of calculating the quantitative, ordinal and qualitative features separately, and then they allow to calculate the overall measure [2, 3]. The algorithm for solving the problem of classification of characteristics of a pedagogical employee is presented in Fig. 3.

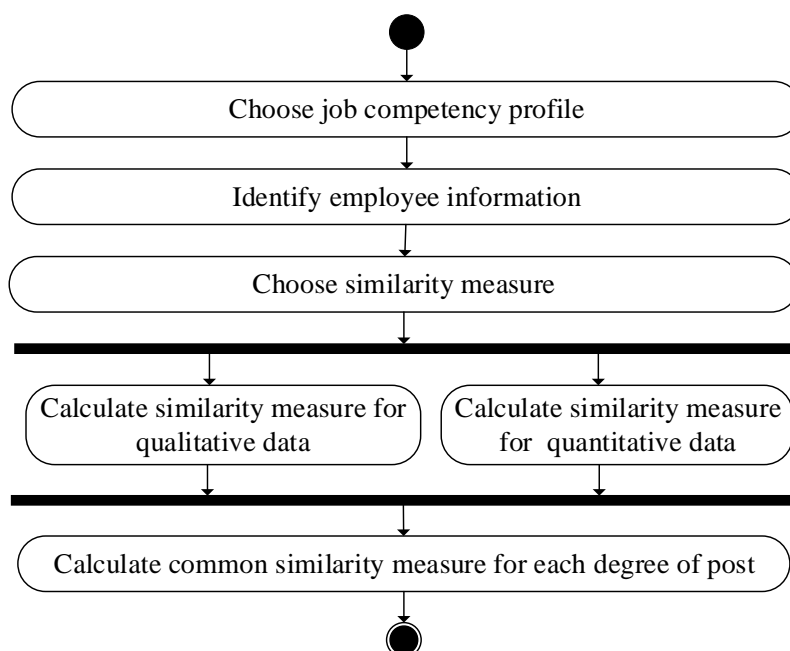


Figure 3 – Algorithm of calculating of post accordance degree

Thus, the proposed algorithm for solving the evaluation problem of pedagogical staff in the educational institution with the help of IS will allow to reduce the time costs for data processing, thus will allow to improve the quality of management decisions.

References:

- [1] *Competency Model*. [Online]. Available: <https://www.valamis.com/hub/competency-model> [Accessed Sept. 30, 2019].
- [2] Brian S. Everitt, Sabine Landau, and Daniel Stahl. *Cluster Analysis*. Wiley, 2011.
- [3] Осипенко, Н. Б. *Пакеты обработки экспериментальных данных на ЭВМ*. Гомель: ГГУ им. Ф. Скорины, 2009.