

Integrated Technology for Personnel Assessment Based on the Competencies Model

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Abstract. The problem of personnel assessment is considered. An analytical review of employee assessment methods is conducted. The functional model of the personnel evaluation process is described. It is suggested to use cluster analysis to determine the resemblance between the job competency profile and employee information. The set of similarity measures to determine the resemblance of mixed data is justified. The use of function of rival similarity is suggested. The personnel competencies model has been developed. The process of complex evaluation of employee characteristics using the developed technology has been improved. Numerical studies of the task have been carried out.

Keywords: job competency profile, classification task, similarity measure for mixed data, Gower coefficient, Voronin measure, function of rival similarity.

1 Introduction

The main objective of every organization is to achieve objectives with maximum efficiency. The primary goal of profit commercial entities is to survive in competitive conditions and get maximum financial profit.

The major aims for non-profit organizations focuses on specific services provided to its target market.

For instance, the goal of many educational institutions is to raise the awareness level of young people; charities help solve some problems through fundraiser; environmental organizations seek to protect the environment from pollution; religious organizations are to be responsible for spiritual development of society. The major driving force for the achievement of the organization’s objectives is its staff, namely the management and employees.

Therefore, only the effective performance of each employee’s functional responsibilities allows to achieve goals of the facility.

Thus, it is clear that the task of staff assessment is one of the most important tasks in the personnel management system.

The process of staff performance evaluation is the determination of compliance of the employee’s business and personal qualities with the requirements of the position.

In other words, there is a process of checking the employee's work activity through the lens of competencies.

Competencies are characteristics of an employees that are important for the effective performance of their job activities in an appropriate position, and which can be measured through employee behavior [1-3].

Job competency profile is compiled for each position. It is a list of competencies specific to the particular job.

The competency profile determines not only what is expected from employees, but also how they should act. It is used in hiring new staff, staff performance evaluation, staff rotation, and in the creation of staff reserves and the development of individual career plans.

Job competency profile is an integral part of the competencies model. The competencies model is not only a list of the appropriate knowledge, practical skills and personal qualities necessary for the qualitative fulfillment of the functional responsibilities of a certain position, but also a list of grades of the degree of correspondence to the position [4, 5].

There are many classifications of competencies. Each institution can choose appropriate separation according to its objectives. Let's consider the following division of the competencies: corporate, managerial and professional competencies [1, 4]. Corporate or key competencies are common to every position of the company, they derive from the values of the company.

Competencies for managers are essential for all executives to successfully achieve their business goals. Professional competencies are specific to concrete positions or groups of positions.

Thus, the process of staff performance evaluation is a comparison of the characteristics of the employee with the developed profile of the position and the subsequent finding the degree of relevance of the position.

A solution to this problem will reveal the existing issues with the personnel, estimate the opportunity to promote certain employees, improve the performance of their work.

Today the process of personnel assessment in in all kinds of organizations is generally carried out at a fairly high level only at the stage of applying for a job. Commercial organizations continue constantly conducting staff evaluation even after trial period ends.

Budget institutions cannot afford to check constantly the job performance of each employee due to lack of funds, because they need to hire an entire department of HR managers who will only be involved in the evaluation process.

At the same time, the task of assessment is characterized by high labor intensity of the development of a competency profile for each position, complexity of choosing a data processing method due to the various nature of the information, complexity of calculations and a risk of error due to human factors. So, many questions related to this task remain open.

Therefore, the purpose of this work is to develop the integrated technology for personnel assessment based on the use of the competencies model.

2 Formal problem statement

The task of personnel assessment is a classification task, as certain set of employee characteristics partially or fully matches the requirements of the position [6, 7]. The mathematical formulation of the task of personnel assessment can be presented in the following way.

Let $K = \{k_1, \dots, k_n\}$ is a set of competencies for particular position. Let $P = \{p_1, \dots, p_m\}$ is a set of classes, which described degrees of matching to a particular position based on a specific scale. The task of employee assessment is a mapping of one set to another $f : K \rightarrow P$.

To solve the problem of staff evaluation, it is necessary to:

- develop a competencies model for the particular position;
- choose a classification method that will allow to evaluate the employee's work activity in relation to the job competency profile;
- determine a class or a value of employee compliance.

3 Literature review

Let's consider the most commonly used methods of personnel assessment in terms of solving the classification task of employee's characteristics regarding the job profile.

- Expert methods. There are many expert methods for employee performance evaluation, for instance, ranking method, 360-degree feedback, paired comparison, management by objectives, behaviorally anchored rating scale [8, 9]. Some of them are characterized by comprehensive employee appraisal, others include only discussion with manager. In any case, expert in the domain forms an expert opinion on staff compliance with their position. Personal opinion of experts, on the one hand, is the advantage of this approach, because expert can take into account the personal impression of the employee when making a decision. On the other hand, it can be considered as the disadvantage, because the expert needs to process a large amount of information of employee's working activity and behavior.
- The naive Bayesian classifier. The Bayesian classifier shows fairly good classification results if there is sufficient statistical information to train [10, 11]. It requires simple calculations and works with any data that can be converted to categorical data. But the main drawback is the assumption that the input data is independent of each other, which in turn can negatively affect the process of creating a job competency profile.
- Bayesian networks. The use of Bayesian networks for staff evaluation is as follows. A separate network is created for each job profile. This stage is characterized by the complexity of choosing the network architecture and the uncertainty of the numerical dependence between job competencies. Then, the network is trained through the use of archival data, and only after that it can be used in staff evaluation. The main disadvantages of this method are the complexity of choosing a net-

work structure, the availability of statistical information and knowledge regarding the connection of input data. Despite of the aforementioned issues, there are many successful applications of Bayesian networks in personnel evaluation [12, 13].

- **Neural networks.** This approach produces good classification results, because neural network can adapt when new information is available. Neural networks are characterized as the robust model (resistant to some failures). It allows to process the information in parallel [14, 15]. Neural networks can accept a mixed data as the input, which can be considered as the advantage of the approach. The downsides are the problem of choosing a particular type of network and its architecture, the training method of neural network, and the compulsory large train pattern with previous results of the personnel assessment.
- **Fuzzy logic.** To use fuzzy logic for solving the classification task of employees, it is necessary to create a database of fuzzy production rules in the form “If ..., then ...”. Each class or degree of compliance to a job is described as a set of production rules. New information on employee should be compared with every rule from database according to fuzzy inference mechanism. This process allows to estimate the proximity of an employee’s data to a certain class [16, 17]. The advantages of this approach are: the ability of using heterogeneous data; the output process is similar to a domain expert reasoning process. The disadvantages are the subjectivity of the expert who creates the competencies model and the lack of an adequate process of reviewing the non-negotiability of production rules for each position.
- **Cluster analysis.** The basis for using cluster analysis for classifying information is a calculation of similarities between compared objects. Information about an employee’s work activity can be in qualitative, quantitative, dichotomous or order number from the proposed scale. Therefore, to find a correspondence between employee data and job profile, it is necessary to use a metric that can handle with mixed data: Zhuravlev metric, Gower coefficient, Voronin similarity measure, Mirkin metric [18-20]. The main disadvantage of this approach is the problem of choosing the right metric. The advantages of the approach are the ability to classify multidimensional observations and the ability to work on small amounts of information.

Taking into account features of the domain as well as pros and cons of the methods of information classification, the cluster analysis is proposed as the approach to the problem solution in this study.

4 Integrated technology for personnel assessment

In general, the integrated technology for personnel assessment can be represented in Data Flow Diagram (DFD) notation. The context or top level shows main function called “Personnel assessment” of the system and interaction of Information system (IS) with the external entities “Head of institution” and “Employee” (Fig. 1).

The top level demonstrates basic flows of the data and information into domain as well.

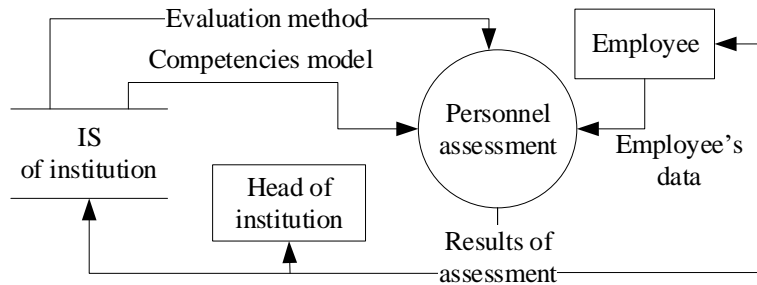


Fig. 1. Top level of DFD

There are several stages of staff assessment [6, 7]. They are shown as the decomposition of DFD (Fig. 2):

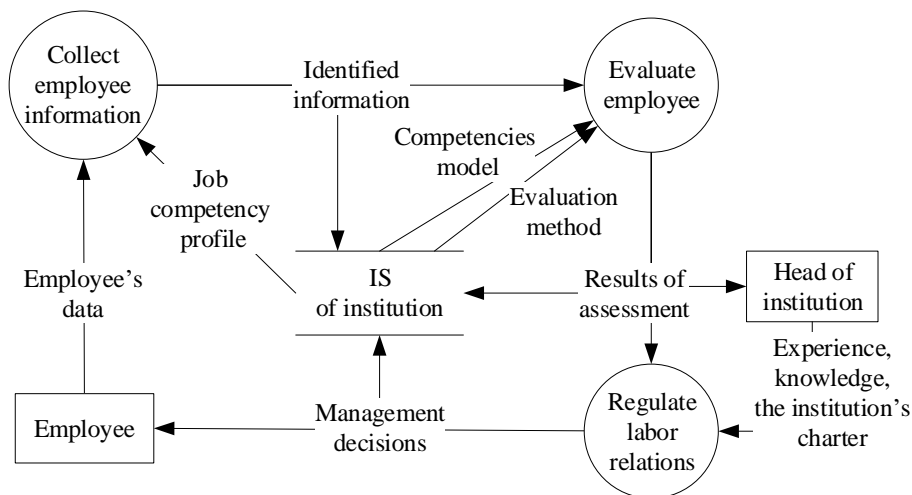


Fig. 2. Interaction diagram of data and external entities in the personnel assessment

1. The preparatory stage. The HR-department of the company compiles job profiles used for staff evaluation. The basis for this process is an analysis of the functional responsibilities and the current work activities of the staff.
2. The stage of information collection. The domain experts and the HR-managers conduct gathering of information about employees in various forms, for example, in the form of questionnaire, testing, interviewing. The obtained information is a framework for the further identification of the data and the determination of values of competencies.
3. The evaluation stage. The analysis of identified information is conducted with the help of the developed competencies model for particular positions and the assess-

ment or the classification method, which allows to identify the level of employee compliance.

4. The results of the personnel assessment are the basis for effective regulating of labor relations. It allows the manager to make management decisions based on her experience and knowledge, as well as official documents of the institution. Such management decisions may include staff rotation, involvement employees into additional activities, improvement of the employee's qualification, increasing the level of employee motivation, identification of possible problems in a certain position, improvement of the personnel management process as a whole.

Thus, the basis for making important managerial decisions in any institution is the result of personnel assessment based on the job profiles, the competencies model and the method of information classification.

Therefore, let's consider the creation of the competencies model for employee evaluation.

5 Development the competencies model for personnel assessment

Let's K is a set of competencies for particular institution, then $T_k, k \in K$ is a set of values of k -th competence. So, $x_{kt}, k \in K, t \in T_k$ is a t -th value of k -th competence.

Let us denote Z as a set of institution employees. Then x_{kt}^z is a t -th value of k -th competence of z -th employee ($z \in Z, k \in K, t \in T_k$).

Let's assume P is a set of positions of the institution, which HR-manager or head has decided to assess. Denote $L, |L|=3$ is a set of degrees of correspondence to each position. Then $l (l \in L)$ is an element of the set L , where $l=1$ in the case of full compliance with the position of the evaluated worker, $l=2$ characterizes degree, when employee needs for advanced training or self-study with additional material that fills the gaps in his knowledge, $l=3$ – the employee does not correspond to the position.

The competency profile for each position is developed individually. So, let's denote designation of the personnel assessment results: $y_{pl}^z (l = \overline{1,3})$ is an indicator of the degree of the z -th employee for p -th position.

So, the mathematical formulation of the task of the personnel assessment based on the competencies model can be presented in the following way: identify the algorithm or mapping of the one set to another: $a : \{x_{kt}^z\} \rightarrow \{y_{pl}^z\}$.

A graphical representation of the compliance assessment of the z -th employee to p -th position is presented in Fig. 3.

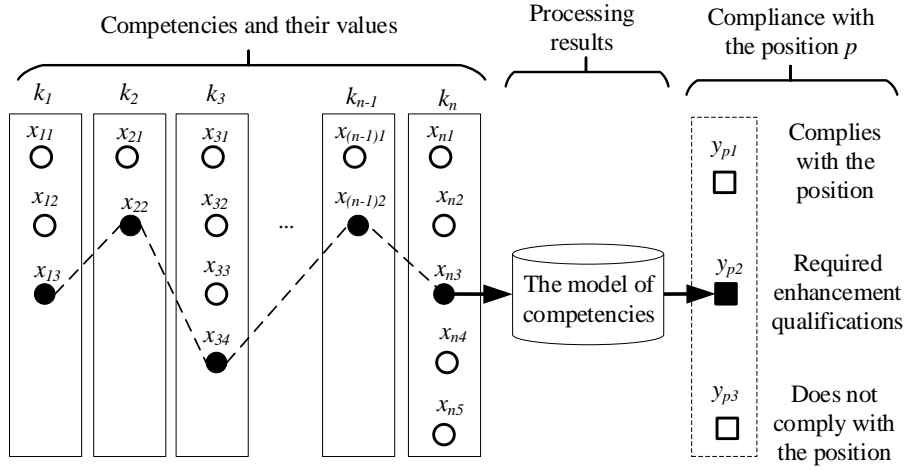


Fig. 3. The process of using of the competencies model

To solve the personnel assessment task, it is suggested to use cluster analysis based on the calculation of the similarity measure between the objects where the degree of compliance with the position serves as a cluster. To find similarity between continuous, ordinal or categorical data at the same time, it is necessary to choose appropriate metrics. There are many different similarity measures, which can be used for mixed data types.

Let's consider one of the popular measure for not matching data. It is a Gower's similarity coefficient [18-21]. To calculate total value of Gower coefficient for results after employee evaluation, let's divide all data onto two categories. First category consists of binary or dichotomous and categorical data, second category consists of quantitative or continuous data. The similarity measure s_{kt}^{zpl} for binary and ordinal data between t -th value of k -th competency of the z -th employee and t -th value of k -th competency of l -th degree of correspondence to p -th position can be calculated as following:

$$s_{kt}^{zpl} = \begin{cases} 1, & x_{kt}^z = x_{kt}^{pl} \\ 0, & x_{kt}^z \neq x_{kt}^{pl} \end{cases}, \quad z \in Z, p \in P, l = \overline{1, 3}, k \in K, t \in T_k. \quad (1)$$

Analogous similarity measure for quantitative data can be calculated as:

$$s_{kt}^{zpl} = 1 - \frac{|x_{kt}^z - x_{kt}^{pl}|}{\max\{x_{kt}^z\} - \min\{x_{kt}^z\}}, \quad z \in Z, p \in P, k \in K, t \in T_k. \quad (2)$$

Let's denote the presence coefficient of the record of t -th value of k -th competence in the job competency profile for l -th degree of correspondence and in the questionnaire of z -th employee as w_{kt} . This coefficient is needed for calculating of total simi-

larity measure of particular employee. The value of the presence coefficient equals zero, if the corresponding record is absent in the job competency profile or in the employee questionnaire:

$$w_{kt} = \begin{cases} 1, & x_{kt}^z \cdot x_{kt}^{pl} \neq 0 \\ 0, & x_{kt}^z \cdot x_{kt}^{pl} = 0 \end{cases}, z \in Z, p \in P, l = \overline{1,3}. \quad (3)$$

The total similarity measure of particular employee is calculated using the formulas (4) or (5) according to the following conditions:

- If each characteristic in the job competency profile has the same weight, it is appropriate to use the Gower general similarity coefficient, which is calculated as follows:

$$s^{zpl} = \frac{\sum_{k \in K} \sum_{t \in T_k} w_{kt} s_{kt}^{zpl}}{\sum_{k \in K} \sum_{t \in T_k} w_{kt}}, z \in Z, p \in P, l = \overline{1,3}. \quad (4)$$

- If some competencies have a greater influence on the job profile than others, then there is a need to calculate the Voronin measure (5), which is a modification of the Gower coefficient.

In order to calculate the Voronin measure, it is necessary to denote η_{kt}^{pl} as a weighted coefficient of t -th value of k -th competence in the job competencies profile of p -th position for l -th degree of correspondence. It should be evaluated according to the suggested importance scale. Head of the institution or HR-manager should determine the appropriate scale. For instance, scale can consist of the following values of importance: “Not at all important”, “Slightly Important”, “Important”, “Fairly Important”, and “Very Important”; or interval scale with range from 0 to 5 can be used as well. More difficult situation arises when expert cannot quantify the competencies. In this case a paired comparison method allows to determine value of importance for each competence by making a qualitative comparison of two objects [21]. For this process the scale of comparison for subjectively paired comparisons was proposed in [21]: equal importance – 1; moderate importance – 3; strong importance – 5; very strong importance – 7; extreme importance – 9; for intermediate cases – 2, 4, 6, 8. It is easier to compare two competencies, due to the fact the expert indicates the extent of importance of the competence in every pair, because one of them is preferable to the other.

So, the formula for calculating the total similarity measure of particular employee according to the Voronin measure takes the following form:

$$s^{zpl} = \frac{\sum_{k \in K} \sum_{t \in T_k} \eta_{kt}^{pl} w_{kt} s_{kt}^{zpl}}{\sum_{k \in K} \sum_{t \in T_k} w_{kt}}, z \in Z, p \in P, l = \overline{1,3}. \quad (5)$$

Let's consider usage of a function of rival similarity or FRiS-function for personnel assessment.

The FRiS-function is a measure of the similarity of two objects that is calculated in relation to some other entity. In [22] it was shown that in many cases this function works better than conventional similarity metrics. Let's $F_{z p_1 / p_2}$ is the FRiS-function of z -th employee of $l_1 = 1$ -th degree of correspondence to P -th position, when the employee is compared with $l_2 = 2$ -th degree of correspondence to the same position

$$F_{z p_1 / p_2} = \frac{s^{z p_2} - s^{z p_1}}{s^{z p_1} + s^{z p_2}} . \quad (6)$$

Similarly, one can calculate $F_{z p_2 / p_1}$ and FRiS-functions for the second and third degrees of correspondence with respect to the first and vice versa. The minimum value is selected as:

$$v = \min \left\{ \bigcup_{u, v \in L, u \neq v} F_{z p u / v} \right\} . \quad (7)$$

Taking into account the aforementioned notations and formulas, the model of competencies can be presented as the following algorithm (Fig. 4).

The usage of the function of rival similarity for personnel assessment allows to make a choice in an ambiguous situations. For instance, we have obtained practically equal results of Gower coefficient or Voronin measure for two classes of compliance of the position. In this case, it's hard to determine the degree of the similarity with the appropriate class. The FRiS-function will enable to get additional results for decision making. Sometimes, the total similarity measures of particular employee for every class of compliance with the position are precise and unambiguous. For that cases, the usage of the FRiS-function for personnel assessment allows to make sure in obtained results.

Proposed competencies model is used for an employee individually. If head of a company decides to check activity of every staff member in a competitive environment, he or she can use competencies model as well. In this case, the results of calculation of Gower coefficient and Voronin measure are the source for decision making. It is necessary to rank people from the particular staff group according to their calculated total similarity measures.

It is obviously the competitive advantage of the employee associates with maximum values of Gower coefficient and Voronin measure. The obtained results can help to choose the best employees, or to find the most suitable staff for new activity in the company, or to determine the weaknesses of the employees, who complies with the position.

Thus, the competencies model for personnel assessment by using Gower coefficient and Voronin measure is proposed. It allows to determine the degree of compliance of the employee to the position.

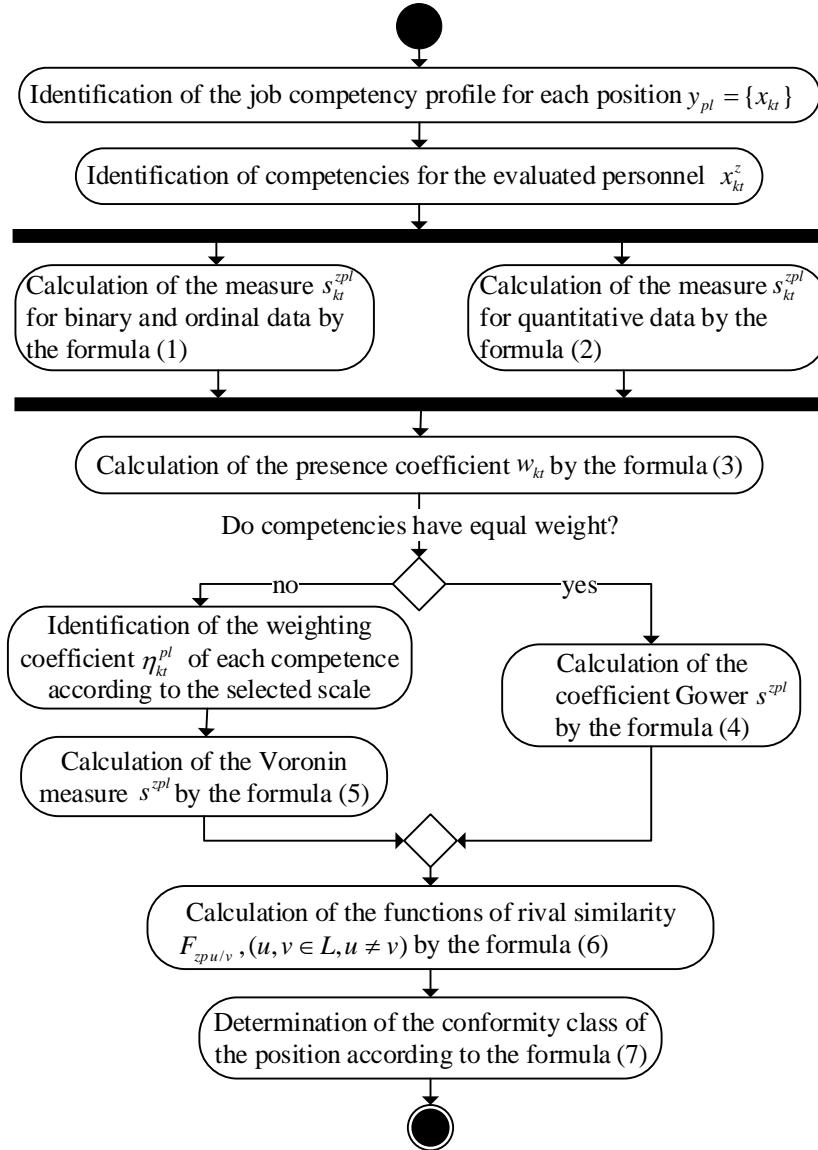


Fig. 4. The competencies model

6 Experiments

Let's consider the use of the proposed technology of personnel assessment by the example of evaluation of teachers of technical departments in higher education. It can be useful for accreditation process of HEIs. During the checking process of accreditation, it is necessary to assess every teacher individually. There is no need to compare

employees with each other. Results of employee evaluation is the source for different documents, which allow to assess activity of an HEI for accreditation process in general. According to the technology, it is necessary to make the job competency profile for the teacher based on the list of competences that are important for the HEI.

Corporate or core competencies represent the interests of a higher education institution. They are used to determine the qualitative composition of the teaching staff at the university. It is suggested to use the following corporate competencies to evaluate the teacher:

- k_1 – the results of professional activity according to item 30 of the Cabinet of Ministers Resolution № 1187 [23]: x_{11} – match, x_{12} – does not match;
- k_2 – certificates in foreign languages: x_{21} – presence, x_{22} – absence;
- k_3 – personal scientific efficiency – number of publications per year (quantitative indicator): x_{31} – no publications, $x_{32} \in [0; 2]$, x_{33} – more than two publications;
- k_4 – scientific title: x_{41} – presence, x_{42} – absence.

The set of managerial competencies for the teaching staff assessment consists of competencies that are important for the achievement of pedagogical business goals of technical departments, faculties:

- k_5 – polite communication: x_{51} – presence, x_{52} – absence;
- k_6 – ability to make quick contact with new people: x_{61} – presence, x_{62} – absence;
- k_7 – ability to do public performance: x_{71} – does not have this skill at all; x_{72} – lack of competence; x_{73} – average speaker; x_{74} – has a good level of competence; x_{75} – a proficient speaker who has contact with the audience;
- k_8 – the ability to convince: x_{81} – presence; x_{82} – absence;
- k_9 – competent language: x_{91} – presence; x_{92} – absence;
- k_{10} – students management: x_{101} – has conflict situations with students; x_{102} – operates strictly within the established framework; x_{103} – confident teacher, able to influence students; x_{104} – is able to negotiate with students at a high level, has respect among students;
- k_{11} – the presence of conflict situations during lessons: x_{111} – presence; x_{112} – absence;
- k_{12} – categoricalness in judgments: x_{121} – presence; x_{122} – absence;
- k_{13} – attitude towards new tasks: x_{131} – open to new tasks, looking for resources and ways to achieve them; x_{132} – accepts new tasks with enthusiasm; x_{133} – constructively discusses new tasks; x_{134} – performs new tasks only if they are expressed in the form of an order; x_{135} – criticizes and sabotages new tasks.

- k_{14} – intolerant of criticism: x_{14_1} – does not accept criticism, even constructive; x_{14_2} – listens carefully to criticism, takes note;
- k_{15} – inattentive attitude to others: x_{15_1} – presence; x_{15_2} – absence;
- k_{16} – poise: x_{16_1} – presence; x_{16_2} – absence;
- k_{17} – neat appearance: x_{17_1} – presence; x_{17_2} – absence;
- k_{18} – conscientious attitude towards their duties: x_{18_1} – presence; x_{18_2} – absence;
- k_{19} – ability to stimulate students to study: x_{19_1} – presence; x_{19_2} – absence.

Some competencies make a positive contribution to conformity assessment, such as polite communication, while others are negative, such as the presence of conflicts during lessons.

List of professional competencies:

- k_{20} – experience as a teacher in years (quantitative indicator): x_{20_1} – 0-3 years, young specialist; x_{20_2} – 4-10 years, teacher with average experience; x_{20_3} – >10 years, experienced teacher;
- k_{21} – professional development related to the teaching of their subjects (participation in conferences, publication of articles, etc.): x_{21_1} – presence; x_{21_2} – absence;
- k_{22} – availability of methodological materials: x_{22_1} – presence; x_{22_2} – absence;
- k_{23} – availability of professional knowledge and skills (assessed separately for each subject taught): x_{23_1} – insufficient level of proficiency; x_{23_2} – satisfactory level, knowledge is not systematic, there are gaps; x_{23_3} – sufficient level; x_{23_4} – knowledge is systematic;
- k_{24} – use of multimedia tools: x_{24_1} – yes; x_{24_2} – no;
- k_{25} – ability to give lectures: x_{25_1} – yes; x_{25_2} – no;
- k_{26} – ability to conduct practical training: x_{26_1} – yes; x_{26_2} – no;
- k_{27} – organization of scientific work with students: x_{27_1} – actively participates in the organization of scientific work with students; x_{27_2} – does not take.

According to the proposed set of competencies, it is necessary to make the job profile for the evaluation of the teacher of the technical department. Depending on the goals of the department, it is possible to create the job profile, where value of each competency belongs to only one class of correspondence, or there is a second variant, when clusters of position is intersected because of the ambiguity of the staff evaluation process.

Let's consider the employee assessment for a teacher who teaches technical subjects related to the development and use of information technology (Table 1).

Table 1. The job competencies profile

Compliance with the position	Values of competencies $\{k_i\}, i = \overline{1, 27}$
Complies with the position	$x_{11}, x_{21}, x_{33}, x_{41}, x_{51}, x_{61}, x_{74}$ OR $x_{75}, x_{81}, x_{91}, x_{103}$ OR $x_{104}, x_{112}, x_{121}$ OR x_{122}, x_{131} OR $x_{132}, x_{142}, x_{152}, x_{161}, x_{171}, x_{181}, x_{191}, x_{202}$ OR $x_{203}, x_{211}, x_{221}, x_{233}$ OR $x_{234}, x_{241}, x_{251}, x_{261}, x_{271}$
Requires enhancement qualifications	$x_{12}, x_{22}, x_{32}, x_{41}$ OR x_{42}, x_{51}, x_{61} OR x_{62}, x_{73}, x_{81} OR $x_{82}, x_{91}, x_{103}, x_{112}, x_{121}$ OR x_{122}, x_{133} OR $x_{134}, x_{142}, x_{152}, x_{161}, x_{171}$ OR x_{172}, x_{181} OR x_{182}, x_{191} OR x_{192}, x_{201} OR $x_{202}, x_{212}, x_{222}, x_{232}, x_{242}, x_{252}, x_{261}, x_{272}$
Does not comply with the position	$x_{12}, x_{22}, x_{31}, x_{42}, x_{52}, x_{62}, x_{71}$ OR $x_{72}, x_{82}, x_{92}, x_{101}$ OR $x_{102}, x_{111}, x_{121}, x_{135}, x_{141}, x_{151}, x_{162}, x_{172}, x_{182}, x_{192}, x_{212}, x_{222}, x_{231}, x_{242}, x_{252}, x_{262}, x_{272}$

Consider a teacher who has passed various types of testing and obtained the following values of the competencies:

- quantitative data $k_3 = 4$ and $k_{20} = 6$,
- binary and categorical data $k_1 = x_{11}, k_2 = x_{21}$ and other competencies values: $x_{42}, x_{52}, x_{62}, x_{74}, x_{81}, x_{91}, x_{103}, x_{111}, x_{121}, x_{133}, x_{141}, x_{152}, x_{162}, x_{171}, x_{181}, x_{191}, x_{211}, x_{221}, x_{233}, x_{241}, x_{251}, x_{261}, x_{272}$.

Suppose that the competencies have the same weight. Thus, for using the developed technology, it is necessary to calculate the Gower coefficient by the formula (4) to determine the similarity between the degrees of correspondence to the position. The calculation results for the particular employee are presented in Table 2.

Table 2. Result of employee assessment

Gower coefficient s^{zp}			FRiS-function				The degrees of compliance
s^{zp1}	s^{zp2}	s^{zp3}	$F_{z p1/p2} / F_{z p1/p3}$	$F_{z p2/p1} / F_{z p2/p3}$	$F_{z p1/p1} / F_{z p3/p2}$	min	
0,23	0,18	0,09	-0,12 / -0,42	0,12 / -0,31	0,42 / 0,31	$F_{z p1/p3}$	$l = 1$

Thus, with the help of the developed technology, it was determined that the employee of the educational institution complies with the position. The proposed technology provides additional information about staff, so it allows to increase the productivity of managerial decisions. The obtained results show the feasibility of using the proposed technology in real conditions.

7 Conclusion

In the course of this study, a comprehensive technology for evaluating employees in higher education has been proposed. The analytical review of the methods of personnel assessment has been done. Cluster analysis methods has been chosen to calculate the similarity between the job competency profile and employee questionnaire. The formalization of the teacher evaluation process using DFD has been presented. A competencies model has been developed to solve the problem.

The scientific novelty of the obtained results is the improvement of the process of evaluation of the pedagogical employees with the help of the proposed technology, which allows to identify existing problems with the personnel assignment. Conducted numerical studies show the possibility of usage of the pro-posed technology in real-world settings at departments in educational institutions to improve the effectiveness of management decisions.

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