Individual Educational Trajectory Ensuring Professionogram-Careerogram Compatibility in the Sphere of Logistics

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***Abstract*—The paper presents the working principle of the model checking the compatibility of professionogram-careerogram to ensure the compatibility of knowledge, skills and personal characteristics of university graduates applying to work in the sphere of logistics with the position they apply for. With the help of the proposed model, compatibility of professionogram-careerogram is first verified by referring to fuzzy sets' theory. If the result is positive, the model decides on the suitability of the applicant for the position. If the professionogram-careerogram compatibility is below the acceptable limit, the model identifies the "weak points" of the applicant in relation to job requirements and generates an individual educational trajectory consisting of these "points". The paper presents a method to select the most relevant content on the topics covered by the individual educational trajectory for the applicant's requirements from the global educational resources.**

***Keywords*—logistics services, human resources, professionogram, careerogram, individual educational trajectory, fuzzy logic, intelligent management**

I. INTRODUCTION

In modern times, logistics services play an exceptional role in the development of domestic and global economy, increasing the pace of production and ensuring competitiveness in the world market. The development of information technology, the Internet and web tools necessitates increasing the level of services provided in this area and reducing human labor, as well as ensuring intelligence and transparency in management. In the society operating in terms of the Fourth Industrial Revolution, the concept of logistics (the service of transporting any cargo from one point to another for a certain fee) becomes more diverse, losing some of its traditional scope. Today, to determine the amount of service fee required for logistics services, the decision that will satisfy all the actors, i.e., the sending, transporting and receiving parties should be made taking into account the physical, chemical, geometric, environmental and strategic characteristics of cargo to be transported, the type of transport to implement the transportation, the vehicle, route and duration of transportation, insurance issues, customs authorization, etc. The functioning of the logistics service market in uncertainty conditions leads to the changes in its structure, the multifaceted, multiple, quantitative and qualitative nature of the indicators to be considered, and the impossibility of its unambiguous definition. These features identify the issue of supply and demand management in the logistics services market as a poorly structured and difficult to formalize [1], [2]. Obviously, the use of fuzzy logic mathematical apparatus is more effective in solving the problems requiring intelligent management.

For example, the RELOG Web tool is designed to provide intelligent management in urban logistics. The software tool is capable to make optimal decisions in the route selection and cargo placement, taking into account 40 parameters for cargo transportation [3]. Blockchain technology is developed for the management of domestic and international cargo transportation [4], [5]. Seco toolkit, together with its POU, SupplyPad, SecoPoint, VIM subsystems, performs the functions of assembly, virtual storage and virtual tracking [6]. One of the important issues to ensure the provision of logistics services meeting the requirements of rapidly changing labor market in the industry 4.0 environment is the training of competitive personnel in this field. In modern times, the study of the structure and requirements of the labor market in professions and specialties section is one of the most pressing and unexplored issues in the world, including in Azerbaijan. Today, the inertia of education system is also in the spotlight of the developed countries, various tools for the integration of labor and education markets are being developed, verified and submitted for discussion on various platforms.

We believe that one of the areas ensuring the flexibility and dynamism of education system may be the personalization of education and the development of individual educational trajectories. Note that the assessment of supply and demand for professions and specialties, the need for education meeting the labor market requirements to shift to narrow specializations' are specified in many political documents as priority issues [7] [8].

II. SPECIALTIES AND PROFESSIONS IN LOGISTICS

To provide the logistics sphere with human resources, staff training on bachelor's and master's degree is implemented in various universities on specialties, such as sales agents, transport service agents, transport service engineers, transportation and transport management engineers, logisticians, transportation managers, customs service managers, warehouse managers, logistics trainers, warehouse process automation specialist, green logistics specialist, delivery chain specialist, transport planner, consignor, etc. [9]. In some universities, these specialties are generalized and called management.

Occupations in the sphere of logistics are hierarchically structured and often generalized as top management in logistics, senior/middle management staff and operational management staff. In Europe, this hierarchy is classified as Supervisory/Operational level, senior level and master level accordingly [10]. Studies show that the problem of certification in logistics sphere is still a priority. In this context, the development of an individual educational trajectory to ensure professionogram-careerogram compatibility for optimal management in logistics sphere is one of the important issues to be addressed.

III. DETERMINATION OF PROFESSIONOGRAM-CAREEROGRAM COMPATIBILITY

Professionogram (lat. Professio - specialty, gramma - describe) is a description of the features of a particular profession, including the requirements for a specialist realizing himself/herself in this area. Taking into account the uniqueness and specificity of the requirements put forward to various specialists by employers in the Industry 4.0 environment, in this work, a competency-based approach is taken as the basis for compiling a professionogram. This approach allows for creating a unified formal model both for describing the requirements for specialists set by employers, and to describe and evaluate the potential of the specialists themselves through the prism of employers' requirements.

Thus, the model of specialty (position) and specialist implies the presence of requirements for at least two generalized types of competencies: 1) professional (functional) competencies related to a certain area of work (specialty) and including everything a specialist should be aware of (knowledge) and capable to perform (skills and abilities) at a specific workplace; 2) personal competencies, including behavioral, communicative, ethical, etc. (team work ability, creativity, transfer of knowledge and skills, responsibility, desire to acquire new knowledge (ability to learn), etc.)

A careerogram is a set of parameters representing the competencies (knowledge, skills, individual characteristics, work experience, etc.) of each applicant.

The Individual Education Trajectory (IET) is a purposeful educational program comprising educational standards and choices to meet them, including open (global) educational resources, which are constantly adapted to the professionogram of the specialty covered by the position [12].

This paper proposes a model and method for determining professionogram-careerogram compatibility, as well as a method for selecting an individual educational trajectory to ensure the maximum compatibility.

The block diagram of the model is presented in Figure 1.

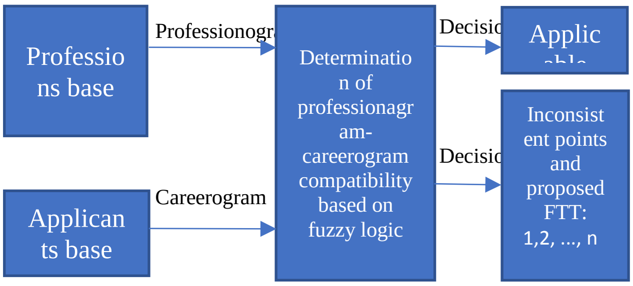

Figure 1. Structural scheme of the model for determination of professionogram-careerogram compatibility.

For more accurate determination of professionogram-careerogram compatibility in the logistics sphere, it is appropriate to view the field of logistics services as an uncertain intelligent environment. In this case, provision of competencies is taken as the basis for achieving the result [13].

A. Fuzzy situation model of supply and demand for applicants

If we conditionally denote the positions required in the enterprises providing services in the field of logistics by "P", then we can describe the requirements for the positions as follows:

$P = \{P_1, P_2, \ldots, P_d\}$ or $P = \{P_b\}, b = \overline{1,d}$ denotes a set of tasks or professionograms;

$V = \{v_1, v_2, \ldots, v_y\}$ or $V = \{v_z\}, z = \overline{1,y}$ denotes a set of personal characteristics (competencies) that a candidate applying for a profession (position) must have; $F = \{f_1, f_2, \ldots, f_r\}$ or $F = \{f_o\}, o = \overline{1,r}$ denotes a set of competencies that a candidate applying for a position must have; $E = \{e_1, e_2, \ldots, e_x\}$ or

$E = \{e_t\}, t = \overline{1,x}$ denotes the required level of knowledge that an applicant must have in individual subjects and themes.

Thus, the demand model for each position is described by three matrices P = (V, F, E): $P_V = \|v_{bz}\|_{dy}, P_F = \|f_{bo}\|_{dr}, P_E = \|e_{bt}\|_{dx}$. Here, each $b = \overline{1,d}$ line of Pb defines the specific tasks required by the logistics service company, and the columns (vdy,fdr,edx) represent the applicant's personal characteristics, professional competencies and ever-expanding base of required knowledge. The elements Vdy,fdr denote the level of possessing separate indicators required to function in particular position, edx denotes the knowledge level in individual subjects required for a particular position. Compliance with the knowledge level is determined by oral, written or test examinations, depending on the theoretical and practical requirements. The degree of the position$P_b\left(b = \overline{1,d}\right)$ to fulfill the indicators vdy, fdr and edx is determined by fuzzy sets, expressed by the following affiliation functions:

$$\mu_{v_{bz}}(P_b): P \times V \to [0,1], \mu_{f_{bo}}(P_b): P \times C \to [0,1], \mu_{e_{bt}}(P_b): P \times E \to [0,1] \quad (1)$$

and represents the level of affiliation required by the company for selected position in terms of individual indicators.

If the candidates for any position in the company are conditionally indicated as "A", then a set of applicants can be $A = \{A_1, A_2, \ldots, A_s\}$ or

$A = \{A_{\square}\}, \square = \overline{1,s}$. In this case, $V = \{v_z\}, z = \overline{1,y}$ denotes a set of personal competencies possessed by the applicant for the position, $F = \{f_o\}, o = \overline{1,r}$ denotes a set of open professional competencies possessed by the applicant for the position, and $E = \{e_t\}, t = \overline{1,x}$ denotes a set of indicators of the applicant's initial knowledge on individual subjects and themes or the careerograms.

In this case, the supply model A = (V, F, E) is also described by three matrices: $A_V = \|v_{\square z}\|_{sy}, A_F = \|f_{\square o}\|_{sr}, A_E = \|e_{\square t}\|_{sx}$. Here, each line $\square = \overline{1,s}$ of Ah characterizes the individual candidates for the claimed profession/position, and the columns (vy,fr,ex) represent the ever-expanding database of applicants' personal and professional competencies and their required knowledge level. The elements Vhy , fhr denote level of possessing separate indicators of the applicant for a particular position, and ehx denotes the knowledge level in several subjects required for a particular position. The degree of affiliation of a specific candidate Ah of ($\square = \overline{1,s}$) V personal characteristics, F competencies and E knowledge levels in subjects is determined by the following affiliation functions:

$$\mu_{v_{hz}}(A_h): A \times V \to [0,1], \mu_{f_{ho}}(A_h): A \times C \to [0,1], \mu_{e_{ht}}(A_h): A \times E \to [0,1] \quad (2)$$

Consequently, there are two fuzzy sets describing the conditions of demand $\tilde{P}_b$ and supply $\tilde{A}_{\square}$ to determine the occupation/position compatibility of the applicant.

$$\tilde{P}_b = \left\{< \mu_{v_{bz}}(P_b) >, < \mu_{f_{bo}}(P_b) >, < \mu_{e_{bt}}(P_b) >\right\} = \{\mu_{p_b}(y)/y\} \quad (3)$$

$$\tilde{A}_h = \left\{< \mu_{v_{hz}}(A_h) >, < \mu_{f_{ho}}(A_h) >, < \mu_{e_{ht}}(A_h) >\right\} = \{\mu_{A_h}(y)/y\} \quad (4)$$

Here, a set$\tilde{P}_b = \{\mu_{p_b}(y)/y\}, b = \overline{1,d}$ is the fuzzy reference situations required by the enterprise for occupations/positions or sought fuzzy images of demand, and $\tilde{A}_{\square} = \{\mu_{A_{\square}}(y)/y\}, \square = \overline{1,s}$ is a set of real situations possessed by the applicant, that is sought fuzzy images of supply.

In this case, the goal of the proposed methods is to recognize their similarity and to identify a pair with a greater similarity by comparing the fuzzy image of each real supply with the fuzzy reference images of demand for the intelligent management of demand and supply compatibility in the process of verifying professionogram-careerogram compatibility [14].

B. Recognition of fuzzy images of supply and demand for applicants

Thus, the goal and purpose of making decisions related to professionogram-careerogram compatibility is based on determining the degree of similarity of the two fuzzy situations and managing the situations using the proximity value. Determination of the degree of fuzzy inclusion of a fuzzy situation $\tilde{A}_{\square}$into a fuzzy situation $\tilde{P}_b$; and the determination of the degree of fuzzy equality $\tilde{A}_{\square}$and $\tilde{P}_b$can be used as a method for assessing the degree of similarity of a random real situation with the relevant reference situation [14]:

1. The degree of fuzzy inclusion$\theta\left(\tilde{A}_{\square}, \tilde{P}_b\right)$ of a fuzzy situation $\tilde{A}_{\square}$into a fuzzy situation $\tilde{P}_b$ is defined as follows:

$$\theta(\tilde{A}_h,\tilde{P}_b) = \&\theta(\mu A_h(y), \mu P_b(y)) = \underset{y \in Y}{\&}\left(\max(1 - \mu A_h(y), \mu P_b(y))\right) = \min\left(\max(1 - \mu A_h(y), \mu P_b(y))\right) \quad (5)$$

If the degree of fuzzy inclusion of a situation $\tilde{A}_{\square}$into $\tilde{P}_b$ is not less than the limit of fuzzy inclusion ψ accepted in accordance with the terms of management, i.e., $\theta\left(\tilde{A}_{\square}, \tilde{P}_b\right) \geq \psi$, then the situation $\tilde{A}_{\square}$is fuzzy included into the situation$\tilde{P}_b$, i.e.,

$\left(\tilde{A}_{\square} \subseteq \tilde{P}_b\right)$. More precisely, if the fuzzy values of the indicators of the situation $\tilde{A}_{\square}$are fuzzy included into the fuzzy values of the indicators of the situation$\tilde{P}_b$, then the situation $\tilde{A}_{\square}$ is fuzzy included into the situation$\tilde{P}_b$.

To make a decision, the fuzzy image (real situations) of each candidate is compared to the reference image of the claimed specialty and the degree of fuzzy inclusion is determined. The specialty with the maximum compatibility is selected as a result of specialty search based on the following expression:

$$\theta(\tilde{A}_h, \tilde{P}_b) = max[min(max(1 - \mu A_h(y), \mu P_b(y)))],$$
$$h = \overline{1,s}, b = \overline{1,d} \quad (6)$$

2. As a measure of the similarity degree of two random fuzzy situations, the fuzzy equality degree is defined as follows. Assume that a fuzzy equality limit $\psi$is specified for two situations, and if there are situations mutually included into each other, i.e., $\widetilde{A}_{□} \subseteq \tilde{P}_b$and $\tilde{P}_b \subseteq \tilde{A}_{□}$, $□ = \overline{1,s}, b = \overline{1,d}, □ \neq b$, then the situations $\tilde{A}_{□}$ and $\tilde{P}_b$ are considered to be approximately the identical. Such similarity degree called fuzzy equality of situations, is calculated according to the following expression:

$$\mu(\tilde{A}_h, \tilde{P}_b) = \vee(\tilde{A}_h, \tilde{P}_b) \vee (\tilde{P}_b, \tilde{A}_h) = \&\mu(\mu A_h(y), \mu P_b(y)) =$$
$$= \min_{y \in Y}[\min(\max(1 - \mu A_h(y), \mu P_b(y)), \max(\mu A_h(y), 1 - \mu P_b(y)))] \quad (7)$$

If $\mu(\tilde{A}_{□}, \tilde{P}_b) \geq \psi$, when $\psi$is included into a certain limit, then the situations $\tilde{A}_{□}$ and $\tilde{P}_b$ are considered to be fuzzy equal, i.e., $\tilde{A}_{□} \approx \tilde{P}_b$.

As the Figure 1 shows, the system makes two decisions as a result of verification of the professionogram-careerogram.

In the first case, the applicant is considered suitable for the position as he/she meets the requirements. If we denote the compatibility degree by any of the matrices $U = \{U_1, U_2, \dots, U_l\}$or $U = \{U_l\}, l = \overline{1,m}$, then all the elements of the matrix U in the first case will get the values less than the limits set.

$$\text{Ul} \leq \psi \quad (8)$$

In the second case, the system will provide the applicant with the points inappropriate for the position he or she is applying for, and it can be assessed as an individual educational trajectory as a set of topics and skills and abilities needed for learning.

In other words, for each violation of the condition Ul ≤ ψ, l denotes the “points” for which the applicant is not suitable for the position, i.e., the missing competencies (knowledge, skills, abilities, etc.). The combination of these “points” generates an individual educational trajectory.

Of course, in a rapidly changing Industry 4.0 environment, flexible curriculum change is often impossible due to formal bureaucratic barriers and lack of appropriate staff. The most effective solution may be to select training materials from open virtual educational resources on topics covering the individual educational trajectory. However, due to a large number of open contents covering the same topic, the question of choosing the one that best suits the applicant’s current potential becomes relevant.

IV. SELECTION OF TRAINING MATERIAL IN ACCORDANCE WITH THE APPLICANT’S REQUIREMENTS FROM OPEN EDUCATIONAL RESOURCES WITH FUZZY MULTI-CRITERIA GROUP DECISION METHOD

As mentioned above, to meet the requirements of ever-changing labor market, each person, graduate and specialist is now faced with the need for lifelong (continuous) education. That is, along with formal education, the role of non-formal and informal education and training, determination, the importance of learning skills become important factors in the realization of self-education opportunities. Today, anyone willing to achieve a certain status can be considered a “continuous learner.”

From this point of view, even if the candidate is not considered suitable for the position (i.e., the violation of condition Ul ≤ ψ is identified), the applicant must advance himself to achieve his/her goal and pursue education on an independently determined individual educational trajectory. In this case, the applicant’ status becomes the learner’s status.

One of the most important issues for the applicant, who has already become a learner, to show more successful results in the next stages, is to find a training methodological kit that meets his/her needs. To provide the learner with the necessary content, the diversity of the subject-content structure in terms of individual parameters and the position as a whole must be taken into account. Thus, when selecting contents for each parameter, the learner’s current potential is taken into account, and after mastering each topic, the learner’s potential already changes anyway. This reveals the diversity of selection conditions.

Given that the content on the topics is developed at different levels, each content to be presented to learner should lead to a positive change in its potential. Therefore, the developed method should constantly monitor the learner’s current potential.

To assess the compatibility degree of the content selected according to the learner’s requirements, a set of contents can be arranged from complex to simple, taking into account the elements of the set of characteristics by levels in the topic-content sphere [15]. When constructing a set of content compatibility by topic, the main point is the equal distribution by level, rather than the number of content topics. Expert knowledge is needed to select the most appropriate content for the individual educational trajectory. In the current situation, the issue can be brought to the issue of arranging the alternatives, taking into account the number of references to the content by learners previously studied on this trajectory and achieved successful results in the next stage, and their advantage relations in accordance with their success in subsequent periods. In this case, the issue can be stated as follows.

Assume that the alternatives, i.e., a set of content covering subjects and topics, a set of criteria for evaluating alternatives (content), and a decision-maker or -makers (learners previously chosen this content), are given. Depending on the nature of objectives, a choice is required, i.e., it can be one of the best alternatives (a content more appropriate to the learner’s position in the trajectory) or a group of alternatives divided into several classes.

The problem of selecting a subset from a set of complex objects refers to decision-making by its nature. Since the presentation of content to learners and the acceptance of this content as the most appropriate content is the decision made by individuals, in such situation, the opinions of experts, success indicators, the author, volume, type of content, etc. are important.

In this case, it is assumed that, depending on the situation, the intelligent support of selection policy can be performed in two ways: 1) the content is presented in accordance with the general potential of learner according to former learners' opinion; 2) the learner finds the content appropriate to certain characteristics.

The main issues in solving the problem of content selection and determination of their relevance include:

1. Most accurate determination of learner's current rating.
2. Formation of a set of possible alternatives (files with different attributes).
3. Description of a set of criteria (type, size, language, author of the content, number of references, success indicator of learners selecting this contend) important for evaluating alternatives.
4. Preparation of criteria scale.
5. Selection of an expert or group of experts (may include former learners as experts).
6. Determination of experts' competence (based on success indicators).
7. Determination of decision-making on the most appropriate content selection.
8. Solution of selection problem using the most appropriate decision-making method for the given problem (decision-making method allowing for the transition from individual assessments to integrated assessment of results is beneficial).
9. Possibility of verifying the adequacy of the decisions made by alternative methods.

Experience shows that, the evaluation of each alternative in the set of alternatives and the expression of an opinion are performed in consultation with a decision-maker or experts who have no a clear judgement. In such cases, a fuzzy opinion may be more comfortable and acceptable to the reality of the initially presented information rather than an ordinary opinion. The fuzzy approach, i.e., an important mathematical concept, allows to analyze and formulate mathematical models of real decision-making problems and is defined as follows:

The subset of the fuzzy Cartesian product X × X characterized by the affiliation function μR : X× X→[0,1] is called the fuzzy relation R in the set X. The value μR(x,y) of this function is understood as a subjective measure or the fulfillment degree of the relation xRy [16]. We use the method of alternatives' selection, taking into account the fuzzy multi-criteria assessment and the preferences of expert team on each criterion in determining the compatibility of content on the parameters within the framework of ensuring professionogram-careerogram compatibility.

Assume that X={x1, x2, ... , xn}={xi, i= $\overline{1, n}$ } is a set of alternatives out of which the best one should be selected, and K={k1, k2, ... , km}={kj, j= $\overline{1, m}$ } is a set of criteria, signs and indicators specific to alternatives. The set of possible alternatives is expressed by a two-dimensional matrix, where the level of the alternative xi to fulfill the criterion kj is determined by the following affiliation function:

φkj(xi):X×K→[0,1]. (9)

Given the set of signs and those preferred by some experts, we use a group decision-making method proposed by Orlovski S.A. [17].

The value of the function ψ (xi, xj, g) expresses the preference relation put forward by the g-th expert out of the set of alternatives, i.e., the advantage of the alternative xi proposed by the g-th expert over the alternative xj.

In this case, ψ(xi, xj, g) has a reflexiveness feature, i.e., ψ(xi, xj, g)=1 for any ∀xi∈X. There is no equation ψ(xi, xj, g)=0, which means that the alternatives xi, xj are not comparable between each other, because we believe that all the alternatives are comparable.

ψ(xi, xj, g) is defined as follows:

$$\psi(x_i, x_j, \mathrm{g}) = \begin{cases} 1 - |\varphi(x_j, \mathrm{g}) - \varphi(x_i, \mathrm{g})|, \varphi(x_j, \mathrm{g}) > \varphi(x_i, \mathrm{g}) \\ 1, \varphi(x_j, \mathrm{g}) < \varphi(x_i, \mathrm{g}) \end{cases} \quad (10)$$

In this formula, φ(xi,g)=min{φkj(xi,g), j=$\overline{1, m}$} and on its basis the matrix of fuzzy preference relations of alternatives for each expert is determined.

On the other hand, the competence of experts evaluating the alternatives (success level of previous learners) differs, and this factor is expressed by the competency coefficient of experts □(g)□[0,1]. Given this and using the following expression

$$\nu(\mathrm{g}_1, \mathrm{g}_2) = \begin{cases} 1 - [\gamma(\mathrm{g}_2) - \gamma(\mathrm{g}_1)], & \gamma(\mathrm{g}_2) \geq \gamma(\mathrm{g}_1) \\ 1, & \gamma(\mathrm{g}_2) \leq \gamma(\mathrm{g}_1) \end{cases} \quad (11)$$

ν:G×G→[0,1] fuzzy competence relations of experts are defined. The quantity ν(g1, g2) is referred to as at which extend the expert g1 is more competent than the expert g2.

The problem is then brought to a rational selection of alternatives out of the set X, taking into account the information described above. For the mentioned g∈G, the fuzzy subset ψn.d.(x,g) of non-preferred alternatives corresponding to the fuzzy preference relationship ψ(xi, xj, g) is determined:

$$\psi^{\mathrm{n.d.}}(\mathrm{x_i}, \mathrm{g}) = 1 \sup_{\mathrm{x_j} \in \mathrm{X}} \left[\psi(\mathrm{x_i}, \mathrm{x_j}, \mathrm{g}) - \psi(\mathrm{x_i}, \mathrm{x_j}, \mathrm{g}) \right] \quad (12)$$

The alternatives giving the highest possible value to the affiliation function ψn.d. (x,g) in the set X coincide with the individual decision of the g-th expert.

Then the fuzzy relations ν(g1,g2) are generalized in the fuzzy subsets of the set G. The following expression for fuzzy relations is used in the set X:

η(xi, xj)= $\sup_{g_1, g_2 \in G}$ min {ψn.d. (xi,g1), ψn.d. (xj,g2), ν(g1,g2). (13)

The obtained fuzzy preference relationship is the result of "gathering" a set of fuzzy relations y(xi,xj,g) into a single final fuzzy preference relationship, taking into account the information on the experts' competence in the subject field. The generalization of preference relationships in the set X allows shifting to the alternatives' selection based on the basis of a single preference relationship, and the set of relevant non-preferred alternatives is determined:

$$\tilde{\eta}^{'n.d.}(x_i) = 1 - \sup_{x_j \in X}\left[\eta(x_j, x_i) - \eta(x_i, x_j)\right] \quad (14)$$

Finally,

$$\eta^{'.n.d..}(x_i) = min\{\tilde{\eta}^{'.n.d..}(x_i),\ \eta(x_i, x_j)\} \quad (15)$$

corrected fuzzy set of non-preferred alternatives is determined from the abovementioned expression and more effective alternative is selected according to the function hn.d.(x) with maximum value.

$$\eta^{'.n.d.}(x) = \sup_{x_j \in X} \eta(x_i) \quad (16)$$

The alternative selected is the final group decision and coincides with one of the individual decisions.

Based on the proposed approach, [18] describes an empirical experiment for obtaining an arranged list of contents by occupation group in the logistics sector and for determining the most priority content.

V. CONCLUSION

The fuzzy situation model presented in the article for assessing the compatibility of supply and demand for professions and specialties can be used as a tool for adequate decision-making in the human resources management in the field of logistics services. Another advantage of the model is the possibility of its implementation in practice.

The proposed method for selecting training materials from open educational resources according to the applicant's needs with the fuzzy multi-criteria group decision-making method allows for more flexible access to content in this field that is more relevant to current knowledge and learning potentials in recruitment, reassignment and self-education stages.

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