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DEVELOPMENT

OF AN EXPERT-BASED MODEL TO ASSESS EDUCATIONAL POTENTIAL USING THE DELPHI METHOD

DESARROLLO DE UN MODELO BASADO EN EXPERTOS PARA EVALUAR EL POTENCIAL EDUCATIVO MEDIANTE EL MÉTODO DELPHI

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ABSTRACT

The study applies the Delphi method to assess the significance of personal characteristics in selecting applicants for university programs. Experts evaluated 28 traits over three survey rounds, with results analyzed using Kendall's coefficient of concordance. The study aims to provide a systematic approach to optimizing admission processes based on expert opinions. The objective is to evaluate the importance of personal characteristics in applicant selection, using the Delphi method to identify key factors influencing educational choices. The Delphi method was used with 21 experts divided into three age groups. Experts ranked 28 characteristics on a 10-point scale, and Kendall's coefficient of concordance was applied to analyze the consistency of the results. The results showed an average level of agreement (W = 0.52), with academic performance, exam subjects, and personal motivation being the most significant factors. Age group differences were noted in expert opinions. The Delphi method proves effective for expert decision-making in education, highlighting the importance of personal characteristics in applicant selection. These findings can improve university admission processes and guide future research.

Keywords:

Delphi method, Applicant, Expert evaluations, Ranking, Concordance, Admission campaign, Higher education.

RESUMEN

El estudio aplica el método Delphi para evaluar la importancia de las características personales en la selección de aspirantes a programas universitarios. Los expertos evaluaron 28 rasgos en tres rondas de encuestas, y los resultados se analizaron mediante el coeficiente de concordancia de Kendall. El estudio busca proporcionar un enfoque sistemático para optimizar los procesos de admisión basándose en la opinión de expertos. El objetivo es evaluar la importancia de las características personales en la selección de aspirantes, utilizando el método Delphi para identificar los factores clave que influyen en las decisiones educativas. El método Delphi se utilizó con 21 expertos divididos en tres grupos de edad. Los expertos clasificaron 28 características en una escala de 10 puntos, y se aplicó el coeficiente de concordancia de Kendall para analizar la consistencia de los resultados. Los resultados mostraron un nivel de acuerdo medio (W = 0,52), siendo el rendimiento académico, las asignaturas de examen y la motivación personal los factores

más significativos. Se observaron diferencias por grupo de edad en las opiniones de los expertos. El método Delphi resulta eficaz para la toma de decisiones de expertos en educación, destacando la importancia de las características personales en la selección de aspirantes. Estos hallazgos pueden mejorar los procesos de admisión universitaria y orientar futuras investigaciones.

Palabras clave:

Método delphi, Solicitante, Evaluaciones de expertos, Clasificación, Concordancia, Campaña de admisión, Educación superior.

INTRODUCTION

The process of higher education is built in such a way that the organization of business processes shapes a specialist in the chosen subject area, who ideally should be able to find their unique place in the professional sphere, thereby impacting socioeconomic relations. The implementation of the educational process in universities is a time-consuming and demanding problem that includes several important elements that affect the development of a professional in one way or another. The applicant's choice of the direction of study is a critical stage of their life. For this reason, identifying a person's aptitudes and placing them appropriately requires an evaluation of their personal qualities and aptitudes not only at the analytical, but also at the methodological level. The mathematical apparatus is generally recognized as a means of confirming or refuting theoretical knowledge, indicating the accuracy of expert judgments put forward and thus proving their validity through strict logical reasoning (Laupichler et al., 2023; Yeh et al., 2018).

The specialist's knowledge, experience, and intuition always play a major role in solving various tasks related to expert evaluation. Nevertheless, no single expert can fully factor in the influence of every possible factor when solving complex problems. Therefore, in the practice of managerial decision-making, great value is attached to group expert evaluation, which allows one to develop an optimal solution (Green, 2014).

When resorting to expert group opinions, it is assumed that the organized interaction between experts on the subject matter will compensate for the biases of individual group members, and that the resulting aggregate group information will be more valuable than what a single group member can offer. Let us consider a concrete example, the Delphi method applied in expert evaluation of the significance of personal characteristics that determine the applicant's consciousness when choosing their training profile as identified by researchers (Mitiurnikova, 2007, 2014).

This kind of research with the Delphi method is widely used as a tool for ranking threats on defense objects (Richards, 2025), creating a holistic educational program, determining priority areas in medical research (best therapeutic methods, the latest drugs, etc.), predicting the evolution of market trends (Mikhailova et al., 2019), and more. However, identifying the most significant reasons for choosing a certain direction of study among the multitude of possibilities, which differ in many ways (social, economic, psychological, etc.), remains an urgent problem in university admission campaigns.

There are numerous methods for evaluating expert judgments, each having certain features and limitations. Table 1 summarizes the leading methods for evaluating decisions (opinions) and their characteristics (Shuffler et al., 2018).

Table 1. Comparative analysis of decision-making methods.

Method	Features	Advantages	Disadvantages
Brainstorming	Experts generate ideas and choose the best ones	Openness; Trust between experts	Requires the right atmosphere for all experts to effectively generate ideas; The final version can be influenced by a single person
Recodification	New ideas on a familiar object (project are formed using the conceptual discovery matrix	Different interpretations of previous ideas allow generating a new idea	Requires a transition from one language to another (e.g., graphic presentation, charts, tables, diagrams)

Focal objects	Properties of randomly selected objects are transferred onto the focal object, giving rise to out-of-the-box solutions	An out-of-the-box view of the task; Simplicity	Lacking selection rules and clear criteria for evaluating the received ideas, the method produces simple combinations, so it is not suitable for complex tasks
Analytic hierarchy process	The expert hierarchically identifies an alternative that best corresponds to the nature of the problem and the requirements to its resolution in an interactive mode (Lubentsov et al., 2019)	Alignment of judgments through prioritization; Ability to decompose a complex problem into several simple ones	Knowing the rating of possible solutions, the expert has to draw their own conclusion depending on the situation; High labor intensity of building the structure of the decision-making model
Morphological analysis	Several key components of the problem are distinguished and solutions to each of them are presented in a table (morphological box); These solutions are then sifted through to identify the priority	Uses a smaller amount of information; Employs the principle of combinatorial approach; Provides the maximum number of solutions	Many solution options, many of which are not informative; No guarantee that all possible solutions to the problem have been considered
The Delphi method	Expert opinions are collected individually and anonymously in several rounds, after which a common decision is made on their basis	Anonymity of participants (freedom of expression and absence of criticism); Participants can be located anywhere; Considers the opinion of a wide range of experts	The opinions are not always correct; New creative solutions are lost when the opinions are generalized; Non-standard solutions are ignored (ideas are selected according to strict criteria); Long waiting time to receive results; Organizers have an influence on the result

Source: developed by the authors.

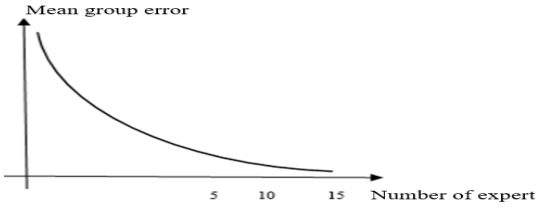
Out examined method, the most promising option for the task of determining the priority direction of training for an applicant is the Delphi method and the analytic hierarchy process. The advantages of these methods allow obtaining quantitative characteristics based on experts' subjective evaluations and deriving a single priority solution (choice). The drawbacks of these options are associated with organizational means and experts' voluntarism, which are not an obstacle to the task set in this study. As a result, the Delphi method was chosen for implementation as a quantitative evaluation method.

Thus, the goal of the article is to explore the use of expert evaluation methods, particularly the Delphi method, in the decision-making process of student selection and distribution within educational institutions.

MATERIALS AND METHODS

In this study, the Delphi method was deployed with a sample of 21 experts (divisible by 3) split into three age groups of seven people to analyze the consistency of different generations of experts and to discover possible problems at the stage of ranking the obtained scores (figure 1).

Fig. 1. Dependence of mean group error on the size of the expert group.



Source: developed by the authors.

The utilized Delphi method (from the Oracle of Delphi), despite certain drawbacks (slow analysis and experts' tendency to show conformism, joining the majority view), is still described by experts (Burda & Kosnikov, 2021; Shchepakin, 2020) as not only effective but also a creative approach to several problems.

The Delphi method is founded on the following principles:

1. The questions posed need to allow for a quantitative response;

2. The expert needs to possess enough information to make an assessment;

3. The expert has to justify their response to each question.

The method involves surveys, each incorporating the information and opinions obtained from the previous one.

The stages of the expert evaluation are described in Table 2.

Table 2. Stages of expert evaluation by the Delphi method.

Stage	Description
Forming a team of organizers and expert analysts	The objective of the analytical group is to organize the procedure of the expert survey. At each step of the study (after each stage), the working group performs statistical processing of the obtained information
Forming the sample of experts	The competence of each expert was determined using surveys, a comprehensive analysis of their publications (the number of papers in the database), self-assessment forms, etc.
Survey	The expert survey is conducted in three (sometimes four) stages, consisting of a series of questionnaires, with questions getting more specific from stage to stage. The wording of the questions should suggest unambiguous answers
Analysis and processing of the information received from experts	The analytical group performs statistical processing of the information obtained from all experts. This analysis included the mean value of the parameter, the weighted mean, the median (Me) as the middle summand in the total set of values provided by the experts, and the coefficient of concordance (W). The experts, under the condition of anonymity, review the analysts' results and conclusions and either update their assessments or leave them unchanged, presenting counterarguments in their favor

Source: developed by the authors.

RESULTS AND DISCUSSION

Group evaluation of the results is understood as the aggregation of individual expert opinions on the preferred order of importance of the considered characteristics in enrollment into a single collective estimate of preference.

The application of mathematical methods and logical procedures, which are used to consolidate expert opinions (quantified), ensures that the opinions of the experts (analytical group) are consistent. It was also statistically established that the mean group error is exponentially dependent on the size of the expert group (Figure 1), the acceptable number falling within the range of 10–20 people. A smaller number of experts will inflate the importance of each expert's opinion, while a larger sample will not ensure a lower mean group error. Moreover, an excessive number of experts can significantly impair the consistency of opinions (YSPU, Center for Information Technologies in Education, 2008).

Stage 1

The 21 recruited experts from different age categories (under 25, 25 to 45, and over 45 years old) were presented with a survey with a sole question:

"***On a scale of 1 to 10, how important are the following characteristics for applicants when choosing their specialty?***".

The survey then provided 28 characteristics to assess the applicant's consciousness in choosing their training profile. All characteristics and their shortened names (for convenience in calculations) are given in Table 3.

Table 3. Characteristics in choosing a specialty.

	Characteristic	Short name
1	Gender	Gender
2	Family composition	Family
3	Children	Children
4	Type of locality of residence	Locality
5	Presence/absence of disability	Disability
6	Type of secondary education	Education
7	Specialties (profiles) pursued during secondary education	Specialty
8	GPA (diploma)	GPA
9	Employment between matriculation and university enrollment	Employment
10	Consciousness in the choice to pursue higher education	Consciousness 1
11	Field(s) of training applied for	Fields
12	Consciousness in the choice of the priority field of study	Consciousness 2
13	Consciousness in the choice of the university	Consciousness 3
14	Difficulties in admission	Difficulties
15	Inclination to relocate after completing university studies	Relocation
16	Acceptance of modes of education alternative to full-time higher education	Other education
17	Desire to balance work and higher education from the first year of study	Balancing
18	Prospects for continued education (second higher education, master's degree, postgraduate studies)	Continued learning
19	Profession obtained after graduation	Profession
20	USE subjects for university admission (including admission exams)	USE subjects
21	Scores for each of the USE subjects (entrance tests on a 100-point scale)	USE scores
22	Having diplomas from the All-Russian Olympiad of Schoolchildren, subject Olympiads from the list of the Russian Council of Olympiads of Schoolchildren	Achievements
23	Parents' educational background	Parent education
24	Parents' social status	Parent status
25	Family income level	Income
26	Attitude to learning	Attitude
27	Main hobbies and spare time activities	Hobbies
28	Life credo	Credo

Source: developed by the authors.

At the first stage, the experts submitted their substantiated answers, summarized in Table 4.

Table 4. Substantiated expert responses.

Significance	Experts																			
	Group 1							Group 2							Group 3					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Gender	3	1	8	1	1	1	4	2	7	0	0	4	6	6	1	2	8	5	0	1	8
Family	4	1	1	4	1	1	2	1	8	5	0	6	4	3	9	4	1	5	0	8	4
Children	10	1	8	2	5	5	10	5	10	5	0	7	3	4	10	5	10	3	0	1	4
Locality	7	5	8	1	8	5	10	7	8	3	0	7	6	4	7	4	1	7	0	4	5

Disability	6	1	0	5	9	8	1	9	7	7	8	8	2	7	7	6	1	5	6	3	8
Education	9	5	10	7	10	7	1	9	7	7	0	8	10	6	8	7	8	8	7	3	8
Specialty	9	9	7	8	10	10	6	10	7	7	7	8	3	7	8	7	10	9	6	1	8
GPA	3	5	10	9	10	10	6	8	7	3	10	8	5	7	10	9	5	8	3	10	9
Employment	7	3	9	1	1	9	3	10	7	2	8	9	5	5	2	1	8	6	2	1	6
Consciousness 1	6	10	10	3	10	10	8	6	5	9	10	7	8	9	5	6	10	10	10	5	7
Fields	5	7	7	10	7	8	10	7	5	5	8	7	2	9	10	10	10	8	9	6	9
Consciousness 2	3	5	5	6	8	5	10	6	5	7	6	7	1	9	8	8	10	9	10	4	8
Consciousness 3	5	5	8	1	10	7	6	6	5	5	5	7	2	5	9	7	10	10	10	4	8
Difficulties	10	3	9	1	2	8	4	2	5	5	0	10	4	3	7	6	5	9	9	5	9
Relocation	10	3	7	4	1	5	10	4	1	5	8	6	5	4	1	7	5	7	9	2	5
Other education	7	4	10	1	1	4	1	2	3	5	8	6	7	2	8	6	9	5	9	5	5
Balancing	4	2	10	7	7	3	1	10	4	8	9	8	4	1	7	0	5	8	8	3	4
Continued learning	10	3	9	8	1	7	1	9	5	9	7	8	8	8	9	8	10	7	10	6	7
Profession	6	9	6	10	8	7	8	4	7	8	8	7	10	8	10	9	7	9	10	8	9
USE subjects	10	10	8	9	10	8	10	2	10	4	10	9	6	8	10	10	7	8	10	10	9
USE scores	10	10	10	10	10	9	10	6	10	0	10	9	2	3	10	9	7	8	10	10	9
Achievements	10	5	10	7	1	8	1	1	4	6	10	7	4	7	10	8	10	10	8	10	6
Parent education	4	1	10	5	1	9	7	1	4	5	7	7	3	4	5	6	1	6	8	10	8
Parent status	4	7	6	2	1	5	3	2	4	3	0	5	5	6	3	4	1	6	0	8	7
Income	7	7	7	7	1	9	8	2	4	3	6	7	2	6	5	7	1	8	2	4	8
Attitude	9	7	9	5	6	8	2	10	8	6	4	10	4	10	10	4	10	10	10	10	10
Hobbies	2	1	7	5	4	2	3	7	7	5	8	7	9	4	5	5	5	6	7	5	5
Credo	8	1	3	5	9	6	6	4	4	4	6	4	5	6	8	7	8	10	7	3	5

Source: developed by the authors.

Stage 2

For each characteristic, an ordered set of scores in decreasing order was compiled.

For example, for the characteristic of "Gender", the set looked as follows: 8-8-8-7-6-6-5-4-4-3-2-2-1-1-1-1-1-1-0-0-0. The median ***Me*** is the middle summand at an equal distance from the beginning and the end of the set (in this case, ***Me* = 4)**.

These values are taken as characteristics of the distribution of significance coefficient estimates:

Me implies the value (characteristic) of the group evaluation, with the preferred interval (between quartiles) serving as an indicator of the dispersion of analysts' estimates. Each expert reviewed the values of these characteristics. Those experts whose assessments fell outside the extreme quartiles were asked to justify their opinions once again (or change them). Other experts were then familiarized with the provided rationale.

Stage 3

Having examined the summarized arguments, the experts revised their estimates. After that, analysts calculated the new medians and quartiles and presented them to experts as a group estimate.

Finally, the experts ranked all evaluations of different characteristics in choosing a specialty, with the highest score corresponding to rank 1, followed by rank 2, 3, etc. (Table 5).

Table 5. Ranking of expert evaluations.

Significance	Experts																				
	Group 1							Group 2							Group 3						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Gender	25	23	13	23	25	27	16	20	7	27	22	28	7	17	27	26	11	24	24	26	8
Family	21	22	27	18	19	28	22	28	22	11	24	23	15	24	10	22	25	27	26	25	27
Children	27	27	28	22	16	22	21	16	26	12	26	22	22	22	24	21	24	28	28	28	26
Locality	13	13	14	24	10	21	13	9	12	22	23	15	8	19	18	25	23	25	25	16	21
Disability	16	24	24	14	9	9	23	5	8	5	8	6	23	8	17	16	22	20	19	20	9
Education	10	14	6	11	6	16	19	7	14	8	12	16	12	16	16	13	14	15	17	22	14
Specialty	9	5	18	6	2	2	12	2	9	2	15	7	21	9	12	9	2	7	20	9	10
GPA	19	12	5	4	3	3	15	8	10	18	2	8	3	10	6	5	18	3	21	2	4
Employment	15	17	11	25	27	19	25	22	21	26	27	27	14	20	26	27	13	22	23	27	20
Consciousness 1	4	1	1	1	1	1	3	12	3	1	1	12	4	2	11	15	1	1	1	12	16
Fields	8	9	19	20	13	11	1	10	17	13	9	5	2	4	2	1	4	10	9	3	3
Consciousness 2	5	11	2	12	11	6	2	13	16	6	18	2	11	3	13	6	3	8	2	11	11
Consciousness 3	20	15	25	27	23	17	14	15	20	19	20	17	26	15	8	12	9	5	8	19	15
Difficulties	26	20	12	28	18	13	17	25	21	24	28	10	19	26	20	19	8	9	12	15	7
Relocation	17	19	22	19	28	23	26	19	28	28	13	25	13	23	28	14	19	19	11	24	24
Other education	14	16	7	26	24	24	24	23	27	15	10	21	25	27	15	18	10	26	10	14	25
Balancing	24	21	8	9	14	25	28	14	15	21	21	24	18	28	19	28	21	16	15	23	28
Continued learning	6	18	10	7	7	15	6	6	18	7	16	9	5	7	9	7	6	18	7	17	17
Profession	18	4	16	3	12	14	9	18	11	3	7	13	1	5	1	3	15	6	3	7	2
USE subjects	1	3	15	5	5	12	7	3	2	4	5	4	9	6	3	2	16	12	4	4	5
USE scores	2	2	4	2	4	4	5	4	1	17	4	3	6	21	5	4	17	13	6	5	6
Achievements	7	10	3	10	22	10	27	26	25	10	3	18	17	11	7	8	7	4	13	6	19
Parent education	23	26	17	15	21	5	11	27	24	14	14	14	20	25	21	17	26	17	14	10	13
Parent status	22	25	23	21	20	20	18	21	23	23	25	26	28	18	25	23	28	23	27	8	18
Income	12	8	20	8	26	7	10	24	25	25	19	19	27	14	22	11	27	14	22	18	12
Attitude	3	6	9	16	15	8	4	1	4	9	6	1	16	1	4	24	5	2	5	1	1
Hobbies	28	28	21	17	17	26	20	11	19	16	11	20	24	13	23	20	20	21	18	13	23
Credo	11	7	26	13	8	18	8	17	13	20	17	11	10	12	14	10	12	11	16	21	22

Source: developed by the authors

Based on the ranking Table 5, we determined the consistency of expert opinions in estimating the significance coefficients of all characteristics in the choice of specialty by the dispersion-based ***Kendall's coefficient of concordance W***.

As a result, the experts established rank differences between all characteristics (no repeating ranks), so ***W*** was calculated by formula (F1):

$$W = \frac{12S}{m^2(n^3-n)}, \quad \text{(F1)}$$

where: m — the number of experts;

n — the number of initial parameters (characteristics);

S — the sum of squared differences (deviations) from the rank sum for each parameter (F2):

$$\sum_{j=1}^{m} R_{ij} \quad \text{(F2)}$$

Then the average sum of ranks for all characteristics is (F3):

$$\bar{R} = \frac{1}{2} * m * (n+1) \quad \text{(F3)}$$

Before the final W, concordance was determined for each of the three groups separately. Table 6 below provides rank sums (Σx_i), deviations from the mean rank sum ($X - \bar{X}$), and squared deviations ($(X - \bar{X})^2$). The next step was to establish a general concordance (Table 7).

Table 6. Results of the conducted expert evaluation for the three groups.

Characteristic	Σ 1	X – X̄	(X – X)2	W1	Σ 2	X – X̄	(X – X)2	W2	Σ 3	X – X̄	(X – X)2	W3
Gender	152	50.5	2,550.25	0.5835	128	25.25	637.5625	0.5743	146	44.5	1,980.25	0.6058
Family	157	55.5	3,080.25		147	44.25	1,958.0625		162	60.5	3,660.25	
Children	163	61.5	3,782.25		146	43.25	1,870.5625		179	77.5	6,006.25	
Locality	108	6.5	42.25		108	5.25	27.5625		153	51.5	2,652.25	
Disability	119	17.5	306.25		63	–39.75	1,580.0625		123	21.5	462.25	
Education	82	–19.5	380.25		85	–17.75	315.0625		111	9.5	90.25	
Specialty	54	–47.5	2,256.25		65	–37.75	1,425.0625		69	–32.5	1,056.25	
GPA	61	–40.5	1,640.25		59	–43.75	1,914.0625		59	–42.5	1,806.25	
Employment	139	37.5	1,406.25		157	54.25	2,943.0625		158	56.5	3,192.25	
Consciousness 1	12	–89.5	8,010.25		35	–67.75	4,590.0625		57	–44.5	1,980.25	
Fields	81	–20.5	420.25		60	–42.75	1,827.5625		32	–69.5	4,830.25	
Consciousness 2	49	–52.5	2,756.25		69	–33.75	1,139.0625		54	–47.5	2,256.25	
Consciousness 3	141	39.5	1,560.25		132	29.25	855.5625		76	–25.5	650.25	
Difficulties	134	32.5	1,056.25		153	50.25	2,525.0625		90	–11.5	132.25	
Relocation	154	52.5	2,756.25		149	46.25	2,139.0625		139	37.5	1,406.25	
Other education	135	33.5	1,122.25		148	45.25	2,047.5625		118	16.5	272.25	
Balancing	129	27.5	756.25		141	38.25	1,463.0625		150	48.5	2,352.25	
Continued learning	69	–32.5	1,056.25		68	–34.75	1,207.5625		81	–20.5	420.25	
Profession	76	–25.5	650.25		58	–44.75	2,002.5625		37	–64.5	4,160.25	

USE subjects	48	–53.5	2,862.25		33	–69.75	4,865.0625		46	–55.5	3,080.25	
USE scores	23	–78.5	6,162.25		56	–46.75	2,185.5625		56	–45.5	2,070.25	
Achievements	89	–12.5	156.25		110	7.25	52.5625		64	–37.5	1,406.25	
Parent education	118	16.5	272.25		138	35.25	1,242.5625		118	16.5	272.25	
Parent status	149	47.5	2,256.25		164	61.25	3,751.5625		152	50.5	2,550.25	
Income	91	–10.5	110.25		153	50.25	2,525.0625		126	24.5	600.25	
Attitude	61	–40.5	1,640.25		38	–64.75	4,192.5625		42	–59.5	3,540.25	
Hobbies	157	55.5	3,080.25		114	11.25	126.5625		138	36.5	1,332.25	
Credo	91	–10.5	110.25		100	–2.75	7.5625		106	4.5	20.25	
	2,842		52,239		2,877		51,417.25		2,842		54,239	
	X_1	101.5			X_2	102.75			X_3	101.5		

Source: developed by the authors.

Table 7. General expert concordance.

Characteristic	Σ	$X - \bar{X}$	$(X - \bar{X})^2$	W
Gender	426	120.25	14,460.0625	0.5147
Family	466	160.25	25,680.0625	
Children	488	182.25	33,215.0625	
Locality	369	63.25	4,000.5625	
Disability	305	–0.75	0.5625	
Education	278	–27.75	770.0625	
Specialty	188	–117.75	13,865.0625	
GPA	179	–126.75	16,065.5625	
Employment	454	148.25	21,978.0625	
Consciousness 1	104	–201.75	40,703.0625	
Fields	173	–132.75	17,622.5625	
Consciousness 2	172	–133.75	17,889.0625	
Consciousness 3	349	43.25	1,870.5625	
Difficulties	377	71.25	5,076.5625	
Relocation	442	136.25	18,564.0625	
Other education	401	95.25	9,072.5625	
Balancing	420	114.25	13,053.0625	
Continued learning	218	–87.75	7,700.0625	
Profession	171	–134.75	18,157.5625	
USE subjects	127	–178.75	31,951.5625	
USE scores	135	–170.75	29,155.5625	
Achievements	263	–42.75	1,827.5625	

Parent education	374	68.25	4,658.0625	
Parent status	465	159.25	25,360.5625	
Income	370	64.25	4,128.0625	
Attitude	141	–164.75	27,142.5625	
Hobbies	409	103.25	10,660.5625	
Credo	297	–8.75	76.5625	
	8,561		414,705.25	
	$\bar{x}$	305.75		

Source: developed by the authors.

The resulting coefficient of concordance W is within the range of 0.4–0.7, which corresponds to the average level of expert consistency. The significance of W is estimated using the table of distribution (Al-Kharusi et al., 2022; Gürler et al., 2028; Pamučar et al., 2024).

It is necessary and sufficient that the determined value of (F4).

$$V = (n - 1) \quad \text{(F4)}$$

be greater than the table value of , determined by the number of degrees of freedom (F5).

$$\chi^2_{\phi} = (n - 1) * m * W \quad \text{(F5)}$$

and the confidence level of P= 0.95 — 0.99.

In our case (F6),

$$\chi^2_{\varphi} = (28 - 1) * 21 * 0.5147 = 291.8404 \quad \text{(F6).}$$

According to the table of distribution, the obtained coefficient of concordance W is significant at the level of P=0.975 (the obtained value must be greater than the table value). The table value of , hence, it can be argued that there is a non-random (based on life experience) consistency of experts' opinions.

CONCLUSIONS

Managerial decision-making is a vital component in the life cycle of any business process. In the field of education, applicants are the central link that affects organizational details and the socioeconomic state. Therefore, annual student selection and their placement in the most advantageous directions of vocational training constitute the primary business process in an educational organization. These processes can rely on quantitative and qualitative expert evaluation to confirm the decision with mathematical tools and thus make an objective judgment. Here it is important to ensure that the evaluation method chosen for the task uses experts' individual opinions, because a discussion of several pre-formed judgments allows them to constructively arrive at one shared opinion.

The coefficients of concordance for the three age groups of experts (under 25, 25 to 45, and over 45 years old) given in Table 6 indicate that the oldest group (*W*=0.61) has more consistent and similar opinions due to their greater experience. Consequently, the evaluations of this group can be used both to determine priority characteristics for admission (colored cells in Table 6) and to establish requirements for the expert commission, which will be useful for further application of expert methods. Notably, the two younger groups have virtually the same concordance coefficients (0.58 and 0.57, respectively), suggesting an equal value of the opinions provided by the chosen age groups.

The significance coefficients assigned by experts to the chosen personal characteristics of applicants following the Delphi method provided for their comparative analysis by priority of importance to determine the priority direction of training. Furthermore, the general concordance coefficient presented in Table 7 (0.52) demonstrates that all three age

groups of experts were equally consistent, although the greatest concordance was observed among experts above 45 years old.

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