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PREFERENCES OF MODERN HIGH SCHOOL GRADUATES: EVALUATING FACTORS INFLUENCING THE UNIVERSITY CHOICE

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Abstract

The paper analyzes the preferences of high school graduates when choosing a university. The authors propose their own methodology for assessing graduates' preferences based on the Saaty's analytic hierarchy process to identify the main significant factors. Based on a factor analysis of explicit (primary) characteristics, latent (hidden) indicators that affect the choice of high school graduates are determined. A comparison of the preferences of high school graduates in 2010 and 2020 is provided, and new relevant motives important when choosing a university are identified. The results obtained revealed the true causes of consumer behavior, characterized by both new and existing latent factors. Proposes a modification of the classical factor analysis by applying the method of analysis of cumulative curves based on the parameterization of Rache, Arnold, Ballou, etc., which allows to determine the optimal number of latent factors allocated and provides a statistically reliable classification of factors at the choice of applicants. Knowing these features in the preferences of applicants greatly simplifies the understanding of what they are guided by when choosing a university. At the same time one of the trends of recent years is clearly visible – the majority of future students relate to the question of choosing a university rather lightly, often without assuming the receipt of certain knowledge, but only continuing their education, for the sake of specific benefits, or in order to stay in the youth environment or for the opportunity to change their living conditions, and for the sake of obtaining a prestigious university' diploma.

Keywords: Analytic hierarchy process, cumulative curves, factor analysis, factor importance estimation, high educational market, high school-graduate preferences

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1. Introduction

The higher education sector in Russia is currently characterized by a high level of competition caused by the struggle of universities at all levels for prospective students and financial means of their parents; bright and highly qualified teachers; well-known practitioners; state bodies' support and lobbying own interests; sponsors' resources. This fight takes place at the regional, federal and even international level, each year becoming more stringent.

A significant impact on competition between higher education institutions is also provided by actions of the state regulator – the Ministry of Science and Higher Education of the Russian Federation, which determines the amount of state support for higher education institutions in the directions and specialties of student's trainings. Because of the imbalance of public funding there is a shortage of budgetary places on economic and humanitarian specialties which are permanently very popular among students, despite the regulator's attempts to raise interest in natural science and, above all, technical areas of training.

Another modern trend is that in the last few years there has been a systematic reduction in the number of public and private universities, their affiliates and other institutions engaged in educational activities – 10% per year in average. One of the main reasons for this, on the one hand, is decreasing in the number of students, including full-time, part-time and self-study places of the universities. On the other hand, the last decade has been a tightening of the system passing the licensing and accreditation of higher education institutions in order to ensure a certain level of educational services. For example, according to (Makeeva, 2018) in the period from 2014 to 2017, the number of universities and affiliated institutions in Russia decreased by 30% (data for January 2018). This situation leaves universities space, requires them to take timely decisions on the development and optimization of their ongoing and strategic activities.

At the same time, the governing bodies have recently criticized the transition in 2010 to the Bologna system of study for undergraduate and graduate programs. At a meeting of the Council on the Russian language, the President of Russia doubted in the feasibility and effectiveness of Russian language teachers' background, divided by undergraduate and graduate programs (Official Network Resources of the President of Russia, 2019). Despite the fact that only a certain set of specialties was discussed at the meeting, it is quite possible that in this regard the entire sphere of higher education in Russia is expected to undergo fundamental changes in the near future.

It is also possible to note the changes taking place in society, both globally and at the federal and regional levels: many sociologists in Russia and abroad note that representatives of "Generation Z" are not in a hurry to enter the university immediately after graduation, but prefer engage in self-identification and self-development, the benefit of modern tools, such as the worldwide Internet and a variety of digital technologies, provide a wide range of opportunities for this. Instead of traditional, they prefer other types of training – webinars, online schools, trainings, master classes, online courses, etc., which subsequently reduces the likelihood of their admission to higher educational institutions, as they independently receive the specific professional skills they need (Stillman & Stillman, 2018).

Thus, studying the preferences of high school graduates is an urgent task, frontier for the development and formation of marketing strategies of higher educational institutions of the Russian

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Federation. This is essentially relevant in light of the fact that a sufficient number of modern studies, in particular, foreign scientists, are devoted to the study of this problem (Chandler, 2009; Chao, 2015; Ouano et al., 2019; Safarmamad, 2019).

2. Problem Statement

The study of the above trends on the market of educational services is in terms of changes in consumer preferences. It is important to consider that the views of consumers are constantly evolving in connection with changing internal and external conditions (economic, social, technological, and so on) in which they exist, which requires researchers continuous monitoring not only of the educational services market as a whole, but individual participants (or groups), first of all, the most entrants (Safarmamad, 2019).

Of course, the simplest variant of the learning preferences of consumers is to ask them about what they expect from the receipt (or non receipt) of higher education. However, when you ask millennials direct questions about their attitude to the choice of educational institutions, often, they will not be able to give definitive answers, but the analysis of these responses is likely to be ineffective (Moskowitz & Gofman, 2007). This arises primarily due to the fact that to formulate questions (or criteria) of selection is not a simple and deterministic task, because each single individual has its own (unique) set of preferences which is not possible to reveal due to the large variety. The solution is to use relative results of a survey of the technique of factor analysis, allowing based on studying of opinions of applicants to highlight the implicit (latent) indicators that actually determine their choice and at the same time, qualitatively characterize the features of homogeneous groups of applicants.

In previous authors' studies (Tsoy & Shchekoldin, 2010b) a similar technique was tested. However, as indicated above, not only the students and their social attitudes have changed over the last ten years, but also the motives of their choice of educational institutions, including appeared brand new, due to technological breakthroughs of 2010s, in particular, the widespread use of digital technologies, social networking, gadgets, etc. Thus the interest is not in just another testing of the developed methods of studying of preferences of the applicants, but also the analysis of the changes that they have undergone over the last decade.

3. Research Questions

Based on the foregoing, the following can be put forward as the main research questions of the presented research:

3.1. What factors and to what degree determine the choice of a university by high school graduates in 2020?
3.2. How are their priorities changing compared to 2010?
3.3. What new motives for their choice have become relevant and why?

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4. Purpose of the Study

The purpose of this study is a comparative analysis of the preferences of high school graduates when choosing a university and updating the methodology for assessing their preferences.

The author's methodology proposed in (Tsoy & Shchekoldin, 2010b) is taken as the basis, which involves conducting a factor analysis of the data of surveys of high school graduates in order to identify latent indicators characterizing the real motives of high school graduates to choose a higher educational institution. The results of the study may be useful to governing bodies in the field of higher education at the regional and federal levels, as well as to university specialists who are engaged in recruiting applicants.

In order to update the methodology, in 2020 repeated focus groups were conducted with specialists in the field of higher education, secondary education teachers, teaching in high school, youth leaders, etc. As a result, an expanded set of factors was formed that determine the motives for entering a university.

5. Research Methods

The authors' technique of the estimation of preferences based on the AHP Saaty's method and factor analysis to identify the main significant factors consists of seven stages (Tsoy & Shchekoldin, 2010b):

1. The formation of the list of factors influencing the choice of the university of high school graduates, based on the analysis of secondary data and the results of the focus groups and in-depth interviews with experts.

2. The development of working tools for research (structured questionnaire) and the choice of indicators and methods to assess preferences of graduates. The importance of each of 20 factors were evaluated on a 10-point scale: while processing the results of the survey it was considered that in the category of "extremely important" are the factors that have mapped the value of 9 or 10, the "important" – 7 or 8 "more exactly important" – 5 or 6, "more exactly unimportant" – 3 or 4, "extremely unimportant" to 1 or 2.

3. The collection and primary processing of the results of a survey of high school graduates through personal and written interviews, including use of self-reported questionnaires and use of Internet technologies.

4. The implementation of the AHP-method (Saaty, 1980) to explore the preferences of graduates, according to which is the matrix of pairwise comparisons of the factors that allows to determine the percentage of influence of various factors on choice of university entrants.

5. The identification of groups of factors based on the analysis of Saaty's matrices, evaluation of the degree of importance of these factors for students that is produced by the method of cumulative curves (Shchekoldin & Lyssenko, 2018).

6. The factor analysis is used to identify hidden (latent) factors (Iberla, 1980; Tsoy & Shchekoldin, 2010a), which describe the real properties of the studied process for the separation of respondents into classes (homogeneous groups of consumers).

7. The build qualitative interpretation of the results and development of recommendations to adjust the marketing strategies of the universities.

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In the framework of our research in 2010 the number of factors was 15, it is less than in 2020 due to connection with the change of social orientation of graduates, and also with the development of new technologies of their interaction, and a number of factors appeared, influence of which in 2010 was insignificant, or these factors were absent by definition, for example, the activity of the university in their social networks, the desire to move to another city, and others.

Both studies were conducted on the basis of the open Day in Novosibirsk State Technical University. In 2010 for the survey by personal interviews methodic was attended by 209 respondents, in 2020 – 267 respondents. A freely distributed system Orange3 (University of Ljubljana, Slovenia) (Demsar et al., 2013) was used as a software for processing, analysis and visualization of the results obtained in 2020.

6. Findings

6.1. Assessing the importance of factors by the hierarchy analysis method

Following the above methodology, based on the AHP-method, an analysis of the opinions of applicants was carried out, the results of which for 2010 and 2020 are given in Table 01 and Table 02, respectively. For convenience the obtained estimates were reduced to a ten-point scale, and the determination of the types of estimates according to the "extremely important" – "extremely unimportant" gradations was made on the basis of the method of cumulative curves analysis based on the parameterization of Rasche, Ballou and Arnold using a partition of the estimated cumulative curves into five parts according to the integral method and the shrinkage method (Shchekoldin & Tsoi, 2016; Shchekoldin & Lyssenko, 2018). The data for Table 01 is taken from a previous authors' study (Tsoy & Shchekoldin, 2010a). In the Table 02 in italics are the factors that were added in 2020 after repeated focus groups.

Table 1. Assessment of the importance of factors determining the high school graduates' choice of University, obtained according to 2010 data

Groups of Factors	Initial Factors	Importance of Factors
Extremely important	Demand for graduates on the labor market	10
	Existence of a specialty applicant is interested in	10
More exactly important	Highly qualified teaching staff	7
	Opportunity to obtain additional knowledge and skills	5
Important	Opportunity to combine work and studies	5
	Prestige of the institution	5
	Training cost (on the tuition-fee basis)	5
	Conditions provided for extracurricular activities	4
	Availability of material and technical base	4
More exactly unimportant	Providing international internships and programs	4
	Scientific and methodological support of the educational process	4
	Opportunity to do research	3
	University studying difficulties	2
Extremely unimportant	Close location of the institution to the place of residence	1
	Living arrangements (on-campus dormitory)	1

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Corresponding Author: Marina Tsoy
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Comparing the data in Tables 01 and 02, we can draw a number of conclusions. First, it should be noted the different content of groups of factors (even in relative units) that arise when analyzing data for different years in almost all categories. It is significant that the factor “Existence of a specialty applicant is interested in” is in the same “Extremely important” group in 2010 and 2020, despite the fact that over the past ten years the list of relevant undergraduate, graduate and specialist programs has changed significantly.

The factor “State license and accreditation existence”, absent in 2010, immediately took a place in the “important” group, which reflects modern realities regarding the processes taking place in the education system of the Russian Federation.

The category of “more exactly important” factors has undergone a major change; in particular, in 2020 it remained only “Training cost (on the tuition-fee basis)” and “Opportunity to obtain additional knowledge and skills”. The remaining factors, which were «more exactly important» in 2010, moved into the category of “more exactly unimportant” The factor “Living arrangements (on-campus dormitory)” turned out to be significantly more important in 2020 than in 2010, which may be due to an increase in the academic mobility of applicants and a redistribution of income. The same trend is confirmed by the emergence of a new factor, “The desire to move to a new city”, which received a rank of “3”.

Table 2. Assessment of the importance of factors determining the high school graduates’ choice of University, obtained according to 2020 data

Groups of Factors	Initial Factors	Importance of Factors
Extremely important	Existence of a specialty applicant is interested in	10
Important	Demand for graduates on the labor market	9
	State license and accreditation existence	8
More exactly important	Training cost (on the tuition-fee basis)	6
	Living arrangements (on-campus dormitory)	6
	Opportunity to obtain additional knowledge and skills	5
	Highly qualified teaching staff	4
	Budget availability	3
	University participation in international ratings	3
	The desire to move to a new city	3
More exactly unimportant	Conditions provided for extracurricular activities	3
	Providing international internships and programs	3
	Opportunity to combine work and studies	3
	Scientific and methodological support of the educational process	3
	Availability of material and technical base	3
	Prestige of the institution	3
	University activity in social networks	2
Extremely unimportant	Close location of the institution to the place of residence	2
	University studying difficulties	2
	Opportunity to do research	1

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The factor “Highly qualified teaching staff”, although it turned out to be “more exactly important” in 2020, in absolute terms, its score almost halved (from 7 to 4), which means that either university applicants consider university teachers as highly qualified specialists a priori and are not worried about establishing the availability of their qualification (while on the part of the leadership of universities the most important requirement for the teaching staff is continuous training), or they do not make this factor so significant for their importance, focusing not on scientific, but purely practical activity, or on the simple receipt of a document on higher education. This statement is indirectly confirmed by the fact that the factor “Opportunity to do research” is in the “extremely unimportant” group, which, in turn, may be because the present study of preferences was carried out among those who entered the economic and humanitarian areas of training, and for applicants interested in other areas of preparation, the situation may be radically different.

All other factors turned out to be in the categories “more exactly unimportant” and “extremely unimportant”, which is explained by the fact that for applicants the concepts of research work, foreign internships, scientific and methodological support of the educational process are rather vague against such factors as “Training cost (on the tuition-fee basis)” and “Living arrangements (on-campus dormitory)”.

6.2. Factor analysis of preferences of applicants for educational services

The direct application of the Saaty method does not guarantee an unambiguous definition of the influencing factors because the actual process of choosing a university by an applicant is not necessarily described within the framework of the proposed set of factors. To reveal the hidden (latent) factors that describe the real properties of the process under study, factor analysis could be applicable. When conducting a study these factors are usually unknown, or not formalized at all, since they are determined as the result of the combined effect of a number of reasons, which, in turn, are initially described by the set of factors that the researcher considers necessary or influencing the decision result (about choosing a university). An analysis of the results obtained by these methods revealed the true motives of consumer behavior in the educational services market. The results of factor analysis are given in Table 03.

Table 3. The relationship of initial and latent factors that determine the motives of behavior of applicants

Initial factors	Latent factors					
	F1	F2	F3	F4	F5	F6
Training cost (on the tuition-fee basis)	0.246				-0.402	
Budget availability	0.360					
Opportunity to obtain additional knowledge and skills	-0.307					
University studying difficulties	0.294					
Close location of the institution to the place of residence	0.329				0.302	-0.383
Demand for graduates on the labor market	-0.344		-0.244			
Opportunity to combine work and studies	0.278		-0.369			
State license and accreditation existence	-0.275	-0.308				

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Prestige of the institution	0.243			-0.402	
Highly qualified teaching staff	-0.283				
Living arrangements (on-campus dormitory)	0.280				0.531
University participation in international ratings	0.324		0.321		
Scientific and methodological support of the educational process	-0.406		0.285		
University activity in social networks	0.360	-0.297			
The desire to move to a new city		0.467			
Availability of material and technical base		0.333		-0.274	-0.305
Opportunity to do research		0.305	0.309		
Existence of a specialty applicant is interested in			-0.465		-0.342
Providing international internships and programs			0.421		-0.255
Conditions provided for extracurricular activities				0.537	0.398

Numerical values in the filled cells of the Table 03 characterize the degree of influence of initial factors on latent values, and are called factor's loads (Iberla, 1980). Dark cells highlight the values of factor's loads of those initial factors that increase the values of the corresponding latent factors (positive dependence), light cells indicate a negative relationship. Empty cells correspond to the absence of a significant relationship between latent and initial factors. The results obtained allow us to give a qualitative description of homogeneous groups of applicants according to the latent factors that have emerged.

Factor F1 – local applicants for whom the budget component and the cost of training are important, planning to combine work and study, but for which the importance of having a license and accreditation by university does not play a special meaning. Moreover, they probably already represent the place where they will work in the future; therefore the demand for their specialty in the labor market is unimportant. It is also possible that most of them are female, because having a university accreditation is usually important for young men who are granted a deferment from the army.

Factor F2 – non-locals applicants, they require a dormitory (a significant number of them are from Kazakhstan, which is geographically very close to the Novosibirsk region), and, in addition, they have a desire to participate in international projects. The learning process is not particularly interesting for these applicants – they do not care who teaches them, it does not matter what equipment and with which technologies, it does not matter whether university has accreditation – they just want to get a Russian diploma. For this target group, the only one of all, the prestige and the rating of the university are very important, as well as university activity on social networks, because applicants of this group are highly mobile and make their choice mainly due to external information about the institution of higher education and the city in which it is located.

Factor F3–- applicants, mainly living in the Novosibirsk region or Siberian Federal District. An interesting fact is that they are not going to work and study in parallel, and that they do not care about the demand for a graduate in the labor market. At the same time the university's activity in social networks is not important for them at all. Applicants from this particular group want to further engage in science, and

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therefore for them the presence of a modern research infrastructure is an important motive when choosing a university. There are many winners of Olympiads and competitions at various levels among the members of this group.

Factor F4 – applicants aiming to continue their studies, perhaps going to enroll in graduate or postgraduate programs at Universities of the international level in the future, or to get work abroad, therefore the positions held by the university in international ratings, the presence of joint programs and internships with universities of other countries, as well as the availability of a scientific and methodological component of the educational process and the ability to do the research work are quite important to them. Perhaps it does not matter for them which particular specialty they can get at the university.

Factor F5 – local applicants who make their choice not on their own, but on the advice and pressure of their parents or relatives, therefore the conditions for extracurricular activities are most important for them, i.e. the opportunity to participate in various sections, play sports, etc., as well as proximity to home. The factors "Training cost (on the tuition-fee basis)" and "Prestige of a university" are not important because their parents consider studying at a university as a kind of "social safe" for their child to avoid various dangers and threats from the environment.

Factor F6 – are the same applicants as those who fall into the previous grade, but come from other regions. So for them one of the important factors is the availability of a dormitory, but at the same time, study as such is not an end in itself. Perhaps some of these applicants are highly qualified athletes, as evidenced by the influence of the factor "Conditions provided for extracurricular activities".

Knowing these features in the preferences of applicants greatly simplifies the understanding of what they are guided by when choosing a higher educational institution. At the same time one of the trends of recent years is clearly visible – the majority of future students relate to the question of choosing a university rather lightly, often without assuming the receipt of certain knowledge, but only continuing their education, for the sake of specific benefits, or in order to stay in the youth environment or for the opportunity to change their living conditions, or for work, study, and for the sake of obtaining a diploma.

7. Conclusion

The basic tendencies of development of educational services market of the Russian Federation were reflected in the results of the study. It was demonstrated that in the structure of the distribution of the underlying factors' importance, the significant changes have undergone, both from the point of view of the arrangement of the groups of factors and their filling. In particular, the factors of "Highly qualified teachers", "Prestige of the university" and "Opportunity to do research work" have significantly reduced their importance, and, on the contrary, the factor "Living arrangements (on-campus dormitory)" has substantially increased its importance. At the same time a new factor of "State license and accreditation existence" turned out to be important and "University activity in social networks", which majority of universities see as an effective lever to increase competitiveness, turned out to be "extremely unimportant".

A factor analysis of the proposed and adapted methods allowed us to determine the true motives of applicants when they choose their university. The main conclusion that can be drawn from these results is that the current generation of students is not particularly interested in the process of obtaining higher education, science and research activities particularly do not attract them, and the reasons for the choice of

a university lie in purely pragmatic blueprints for the future – obtaining the higher education diploma, moving to another city, hanging out in the youth environment, being involved in student life and extracurricular activities.

In comparison with situation in 2010, there is a new segment of students that are focused on the continuation of studies abroad, for which important motifs are the presence of the university joint international programs and internships, as well as the positions of the university in international rankings, such as QS, the ranking of universities in the world. The results may require deeper analysis to determine not only statistical reasons for the separation of the latent factors, but also social and perhaps economic motives of students and their parents influence the choice of a particular higher educational institution. Because of its universality, the method presented in the paper could be also applied for the analysis of preferences of consumers of any other goods and services.

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