DOI: 10.15838/esc.2022.1.79.10
UDC 331.552, LBC 74.200.52
© Gainanov D.A., Ataeva A.G., Migranova L.I., Atnabaeva A.R.

Irrationality in the Behavior of Applicants as a Factor in the Imbalance of Labor Markets and Educational Services in the Region

Damir A.
GAINANOV
Institute for Social and Economic Research, Ufa Federal Research Center of the Russian Academy of Sciences
Ufa, Russian Federation
e-mail: 2d2@inbox.ru
ORCID: 0000-0002-2606-2459; ResearcherID: O-5141-2015

Aisylu G.
ATAEVA
Institute for Social and Economic Research, Ufa Federal Research Center of the Russian Academy of Sciences
Ufa, Russian Federation
e-mail: Ice_lu@mail.ru
ORCID: 0000-0002-2835-0147; ResearcherID: O-4507-2015

Liliya I.
MIGRANOVA
Institute for Social and Economic Research, Ufa Federal Research Center of the Russian Academy of Sciences
Ufa, Russian Federation
e-mail: lilya2710@yandex.ru
ORCID: 0000-0002-9794-9292; ResearcherID: O-4506-2015

Alsu R.
ATNABAEVA
Institute for Social and Economic Research, Ufa Federal Research Center of the Russian Academy of Sciences
Ufa, Russian Federation
e-mail: alsouy@mail.ru
ORCID: 0000-0002-7042-1180

For citation: Gainanov D.A., Ataeva A.G., Migranova L.I., Atnabaeva A.R. (2022). Irrationality in the behavior of applicants as a factor in the imbalance of labor markets and educational services in the region. *Economic and Social Changes: Facts, Trends, Forecast*, 15(1), 194–208. DOI: 10.15838/esc.2022.1.79.10

Abstract. One of the reasons for the imbalance of labor markets and educational services is that applicants choose the universities and the specialties that are unclaimed in the present and future labor market. The article presents the results of an empirical study on identifying behavioral patterns of applicants when choosing a direction of study and higher education institution (2021, N = 4228), which was conducted among 10th and 11th graders of the Republic of Bashkortostan. We considered the results of the survey broken down by three territorial blocks: the capital (urban district of Ufa); urban area – 8 urban districts; rural area – 54 municipal districts. The analysis revealed three irrational patterns of behavior among applicants: 1) choosing "easy" humanities and economic specialties as the subject of the Unified State Exam (USE), not allowing to enter the desired in-demand specialty; 2) desire to enter a "promising specialty" not related to the choice of the USE; 3) applying for specialties not related to the choice of the USE subject and the desire of the entrant. During the study we found that the irrationality of an applicant's behavior in a difficult situation associated with the multiparameter choice of training program and higher education organization becomes one of the causes of imbalance in the labor and educational services market in the region. We determined that further research on the behavior of applicants should be conducted in the following directions: modeling and forecasting behavior of applicants (development of a comprehensive agent-based model of the educational system of the region, allowing for computational experiments to assess the impact of various mechanisms of state influence on the behavior of agents (applicants), and the development of practice-oriented and interactive methods of vocational guidance among school students, especially in rural areas.

Key words: labor market, educational services market, behavior of applicants, irrational behavior, sociological survey, agent-based modeling, imbalance of educational services and labor market.

Acknowledgments

The research was performed within the framework of the state assignment for the UFRC RAS No. 075-00504-21-00 for the year 2021.

Problem statement

One of the important problems in the modern economy is the imbalance of labor markets and educational services. It lies in the following contradiction: educational institutions train specialists in some programs in a volume that the economy does not require, while there is a shortage of training in other specialties. This leads to unemployment, social tension, and economic losses. The reasons for this situation are as follows: the problems of forecasting staffing needs, the time lag between the current needs of the economy and the response of the educational system, and the orientation of educational institutions to the preferences of applicants, whose behavior is not always rational.

The imbalance of labor market and educational services is one of the reasons for the loss of human capital in a number of Russian regions. For example, in the Republic of Bashkortostan, which is characterized by a positive natural increase, the decrease in population size is caused by a high value of migration loss. In 2020 the number of migrants in the Republic of Bashkortostan was 125 thousand people, i.e. 3% of the total population of the region. The main number of migrant departures

(43%) falls on the age of 15–29 years, i.e. the age at which people obtain higher education and get a job. In 2021, 40% of all high school graduates left the region in order to enter universities. These applicants are not migrants, but as the evidence from practice shows, most of them do not return to the republic.

The economic behavior of individuals (applicants) when choosing an academic path can be considered from the perspective of several economic theories: classical, behavioral, institutional (Koksharov, Agarkov, 2015). According to the classical theory, applicants make decisions based on rationality and completeness of information, considering the goal of maximizing the utility of their education, including consideration of future income (Gerard, 1956). Most applicants must choose the subject for the Unified State Exam (USE), the university and the specialty, considering the proportion of employment in the specialty and the level of wages, which does not correspond to Russian realities.

Limited rationality corresponds to the provisions of behavioral economics, which combines the achievements of psychology with the neoclassical economic theory. In this case, economic agents (applicants) may react differently to the same situations and conditions and underestimate the maximum results, which are just probable (a prestigious university, a specialty promising high wages), in favor of the average ones that can be guaranteed (an "easy" to pass USE, an average regional university, a common specialty) (Kahneman, Tversky, 1979).

Under the theory of institutional economics, the individual will be guided not by their own inner desires, but by institutional constraints and "collective interest, if this adherence serves to better achieve their individual goals" (Baldanov, Dondokova, 2015).

Factors influencing applicants' behavior have been extensively studied in contemporary foreign research. Some works analyze the behavior of applicants depending on the "well-being" of high school (Delaney, Deverew, 2020), racial and ethnic differences (Black et al., 2018), gender (Bord n et al., 2020), university ranking (Broecke, 2015), etc. For example, a study by S. Broecke proves that in-country university rankings have a statistically significant impact on the choice of applicants, especially those with better grades and from wealthy families, while black, older, and lower-performing applicants tend to avoid universities with high rankings (USA) (Broecke, 2015).

A number of researchers have developed models of the likelihood of choosing to go into higher education or a particular higher education institution, type of study, or training program (Broecke, 2015; Spiess, Wrohlich, 2010; Gibbons, Vignoles, 2012; Suhonen, 2014). In particular, they have created gravity models to consider student flows into higher education (Suhonen, 2014; Alm, Winters, 2009; Cooke, Boyle, 2011; Faggian, Franklin, 2014; Cullinan, Duggan, 2016). For example, one model proves that increasing the distance to a university by 100 kilometers decreases the probability of choosing it (Finland) by 15% (Alm, Winters, 2009). Results of another gravity model show that higher-performing students are more focused on the type of institution rather than its location, while lower-performing students pay more attention to the cost of education and the location of the institution (USA) (Faggian, Franklin, 2014).

Obviously, it is necessary to understand that conducted studies are connected with the specific features of each country. But the statement of the problem and the developed methodological approaches to modeling would be useful to consider in the context of the Russian Federation regions,

although in the Russian science the analysis of applicants' behavior rationality is not so widespread. There are authors who analyze the "collective rationality" of individuals, according to their research, "unbalanced demand for certain training programs is related to the established social values that need to be formed in the regional markets of higher education services" (Baldanov, 2015). There are works that use mathematical models to estimate the significance of rational economic expectations when applicants choose their academic path. Thus, V.A. Koksharov and G.A. Agarkov determined that the factors that ensure the formation of optimal academic paths are the expectation of high income after graduation and the possibility of reducing the cost of education or state-funded place, while success in education does not affect the choice of the optimal, in terms of economy, academic path (Koksharov, Agarkov, 2015). Various models of applicants' behavior have been developed, including agent-based (Makarov et al., 2020) and simulation-based models.

At the same time, there are not enough studies related to the empirical analysis of the rationality of applicants' behavior based on sociological surveys, which should include not only immediate (11th grade students), but also future (10th grade students) applicants. Consideration should be from the perspective of how their preferences in the choice of USE subject, university and specialty change under the pressure of the institutional environment, followed by a comparison of the survey results and the actual behavior of applicants in terms of the choice of university and specialty.

We set a goal to reveal the irrationality of applicants' behavior, influencing the imbalance of the labor market and educational services, by means of a sociological survey, covering 10th- and 11th-grade students from 62 municipal formations of the Republic of Bashkortostan.

Research methodology

We conducted a survey among 10th–11th graders from 8 urban districts and 54 municipal districts of the Republic of Bashkortostan supported by the Ministry of Education of the Republic. Because the sample included underage students, the Ministry of Education sent out letters prior to survey to get permission from the students' parents before the survey began.

The survey was conducted from May to June 2021. We developed a questionnaire consisting of 28 questions divided into several blocks. In most cases, we used single- and multiple-choice questions, and 6% of respondents expanded their answer with additional comments. The survey, developed on the Google Forms platform with the assistance of the Ministry of Education of the Republic of Bashkortostan, was sent to schools of the region via e-mail. We chose the Google Forms platform was because of two factors: 1) no admission to schools and a preference for distance forms of survey in the COVID-19 pandemic; 2) the Ministry of Education of the Republic of Bashkortostan has experience in conducting such a survey. In addition, the use of Google Forms has significantly reduced the time and effort required to process the results.

The total sample was 35,628 people. We used the quota sampling method to determine the sampling population. As quota parameters we used socio-demographic characteristics: 1) place of residence (according to statistical data on the number of schoolchildren in the municipalities of the Republic of Bashkortostan); 2) age (we identified two age groups: 16–17 and 18–19 years old). The volume of quota sampling is calculated by multiplying the number of answer choices for each of the selected characteristics (place of residence, age) by the minimum number of people in the surveyed group. The sample consisted of 4,228 schoolchildren. In

each municipal district and urban district of the Republic of Bashkortostan we interviewed students of several educational institutions. Thus, the representativeness of the sample was ensured. The sampling error with 95% confidence probability was 1%.

The results of the survey are considered broken down by three territorial blocks: 1) the capital (urban district of Ufa) – as a separate category for the study; 2) urban areas – urban districts (Agidel, Kumertau, Neftekamsk, Oktyabrsky, Salavat, Sibay, Sterlitamak); 3) rural areas – municipal districts (54 municipalities).

Main results

It is worth noting first that the study of the rationality of applicants' choice as an imbalance factor is especially relevant in the period of massification of higher education in Russia. We can agree with the opinion that "in the future possession of higher education will become a prerequisite for an individual's competitiveness and may lead to total higher education" (Maksimov, Telezhkina, 2019). In this regard, it is important for the country/region that individual academic paths (including the choice of higher education) correlate with the strategic objectives, priorities of territorial development, in accordance with which the state invests in the forms and specialties of education. The correspondence of expectations of territorial socio-economic systems and individuals affects the imbalance of the labor market and educational services.

The authors understand this imbalance as a discrepancy between the structure of vocational education and the current and future needs of the labor market in terms of qualifications and professional structure, which leads to a shortage of qualified personnel in a number of professions and specialties (Gainanov, Migranova, 2013). The factors causing the imbalance in the Republic of Bashkortostan are identical to those in Russia as a whole. A higher level of unemployment, lower wages than in Moscow and Saint Petersburg are objective imbalance factors, the subjective factors include irrational behavior of applicants.

According to classical theory, the rationality of an applicant's behavior is determined by the achievement of maximum utility of an education, considering future income and employment in the specialty (Gerard, 1956). R.M. Melnikov assessed the rationality of behavior from this point of view. He identified gender differences from the position of unemployment and income level. Thus, the probability of men's unemployment does not depend on the interaction variables of educational level and profile, in contrast to women, whose "probability of unemployment decreases with higher education in the medical field and in information and communication technology" (Melnikov, 2018). The author determined that in terms of future income for men the most effective academic path is to get an education in information and communication technology, for women – higher medical education.

Accordingly, the reverse situation, when applicants' choice of training program does not depend on the expected level of income and employment, and reflects the irrationality of applicants' behavior. Such irrationality is initially associated with the choice of education: university and specialty, as well as the USE subject for admission to a particular university for a particular specialty, so-called "bifurcation points" of the applicant's behavior, in which the choice and a certain phase transition occurs.

Considering the above, we analyzed the results of the survey at the following points: 1) the choice of the USE subject; 2) the choice of the university and then the specialty or first the specialty and then the university; 3) the final choice and applying for university admission.

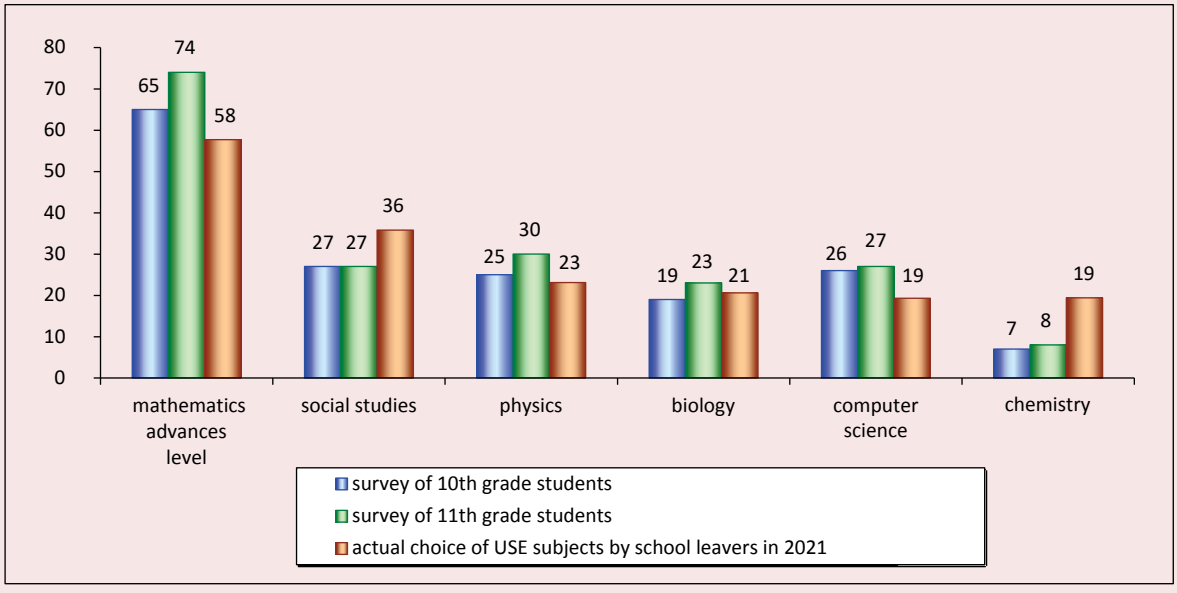
Choosing a subject to take the USE

In the Russian educational system, the academic path of an applicant begins with the choice of a subject for the Unified State Exam in order to enter a higher educational institution in the future. Examinations in such subjects as Russian language and mathematics are compulsory for all school leavers. Passing these examinations is necessary in order to receive a high school diploma. In order to be admitted to university, applicants must take some optional subjects. Accordingly, the questionnaire included questions concerning the choice of non-mandatory USE subjects. On average, the distribution of answers to the question "What USE subjects are you planning to take?" is as follows: mathematics (advances level) – 69% of respondents, physics – 28, social studies – 27, computer science – 25, biology – 21, chemistry – 8%.

In order to determine the difference in the choice of the USE subject depending on the "remoteness" of the deadline for passing the subject, we divided the answers of students of the 11th and 10th grades *(Fig. 1)*. At the moment the results of the USE for 2021 are already known, so they are also presented in Figure 1.

Comparison of the survey results with real data on passing the USE confirmed the first point of irrationality in the academic path of applicants. Thus, 74% of surveyed students of the 11th grades planned to take the Unified State Exam in mathematics (advanced level), in fact in 2021 this subject was chosen by only 58% of students, 30% – physics, in fact it was taken by only 23%, 27% – computer science, in reality – 19%. On the other hand, the proportion of students who eventually chose chemistry more than doubled, from 8% to 19%. Also, students changed their choice with respect to humanities subjects: the proportion of students who actually took social studies increased to 36%, compared to the planned 27%.

Figure 1. Planned and real choice of subjects for the USE by students in the Republic of Bashkortostan, %



Source: Ministry of Education and Science of the Republic of Bashkortostan: Official website. Available at: https://education.bashkortostan.ru/; survey results.

At the same time, the deviation from reality with respect to six subjects is smaller in 10th grades (6.5% vs. 8.8% for 11th grades). Perhaps students who have a longer time lag before actually choosing a subject are more rational in assessing their abilities in contrast to 11th graders, who are influenced by the external institutional and psychological environment in their final year.

It is quite possible that 11th graders initially choose the subjects needed to enter more prestigious universities for more in-demand professions. For example, when taking the USE in physics and computer science (taking into account the mandatory USE in Russian language and mathematics (basic level)), the applicant can choose from almost 80 different areas[1]. If they take "humanities" subjects (social studies and history), the range of choices is narrowed to 20–30 areas. The choice of physics and mathematics subjects increases the chances of getting a state-funded place: according to a number of studies, a combination of subjects "mathematics + Russian + physics" is allocated 43.14% of state-funded places[2], the combination of "mathematics + Russian + computer science" – 12.11%, while the combination "mathematics + Russian + social studies" – only 8.33%, "mathematics + Russian + history" – 7.14%.

But by the time the real deadline approaches, applicants do not think about the vector of their academic path and are guided by short-term goals – to successfully pass the USE, hence choosing an "easier" subject according to their subjective perception.

It is interesting to consider the territorial distribution of USE subject choice. When analyzing the data by territory, the following regularities can be identified: applicants more often choose to take mathematics (advanced level) and computer science in the capital, in rural areas these subjects are less popular. The ratio "mathematics (advanced level) : computer science : physics : social studies" for the capital of the region is "74% : 31% : 28% : 28%", for the other seven urban districts of the republic – "69% : 25% : 32% : 25%", for the 54 municipal districts – "66% : 21% : 26% : 27%".

In general, the first factor in the irrationality of the applicant's behavior is the desire to take an "easier" subject. We can agree with the opinion that "one of the reasons of disproportions toward the humanities in universities can be considered the higher difficulty of passing the USE in mathematics, physics and other non-humanities subjects" (Baldanov, Dondokova, 2015), and "difficulty" is determined by subjective perception and the psychological environment in which the school student is studying.

Choosing an educational institution

The analysis of students' answers about the choice of university characterizes the growing problem associated with the threat of the loss of human capital in the Republic of Bashkortostan. Almost half of the surveyed students (42.9%) are planning to enter universities in other regions, 40.4% – universities of the Republic of Bashkortostan, 10% – vocational education institutions and technical colleges, 6.5% – plan to work. And the problem has a pronounced territorial character: 70% of applicants from Ufa want to enter universities in other regions, from other urban districts and municipal districts – 52% and 55% respectively. Thus, 55.2% of those who graduated with a gold medal and 44.7% with a silver medal are planning to leave.

[1] Graduates chose social studies, history, physics, and literature as their USEs. *Rossiyskaya Gazeta – Nedelya*, 22(7485). Available at: https://rg.ru/2018/02/01/vypuskniki-predpochli-sdavat-ege-po-gumnitarnym-predmetam.html

[2] Where it is easiest to get a state-funded place and the best set of USEs. Available at: https://tabiturient.ru/article/1/

The choice of university in terms of its location and, as a consequence, the threat of the loss of human capital of the region is not the focus of our study, so next we will consider the choice of specialty.

Choice of a training program

The results of the choice of specialty according to the survey are presented in *Table 1.*

As we can see, the leading engineering specialties, which in the questionnaire for students were listed as architecture, computer science and computer engineering, electronics, photonics, nuclear energy and technology, weapons and weapon systems, aviation and rocket and space technology, nanotechnology and nanomaterials. This is a large enough range of professions of a very different nature, which determined their leadership. Moreover, while 10th graders have not yet fully determined their choice (their three leading specialties range from 20.3% to 26.1%), eleventh graders have a clear preference for engineering specialties (29%).

The vast majority of 11th grade students in Ufa (36.4%) choose engineering specialties (the gap with the specialties of the "social sciences" direction is 15.9 p.p.). A similar situation occurred in other urban districts – slightly less than a third of students (the gap with "social sciences" is 15.2 p.p.). In rural areas the proportion of students planning to enter engineering specialties is 22.8% (the gap with "social sciences" is only 1.2 percentage points).

When choosing a specialty, respondents pay attention to the following factors: 72% of 10th–11th graders – wage level, 64% – prestige, 36% – novelty of specialty, 31% – difficulty of education, 30% – opinion of parents (relatives).

Table 1. Results of the student survey on the choice of education specialty, 2021, %

	Hum	Med	Eng	Art	Nat	Soc	Ped	Agr
Choice of specialty by 10th and 11th graders								
Choice of specialty by 10th graders (N = 1843)	10.0	14.2	26.1	4.8	20.3	21.0	2.6	0.9
Choice of specialty by 11th graders (N = 1785)	9.3	14.3	29.0	4.2	18.0	20.6	3.1	1.5
Choice of specialty by 11th graders, depending on place of residence								
Students of Ufa (N = 635)	7.7	10.4	36.4	3.6	17.2	20.5	2.8	1.4
Students from other seven city districts (N = 242)	8.7	13.6	32.6	3.7	19.8	17.4	2.9	1.2
Students from 54 municipal districts (N = 908)	10.6	17.3	22.8	4.7	18.1	21.6	3.3	1.7
Choice of specialty by students of the 10th and 11th grades, planning to study in the Republic of Bashkortostan								
Choice of specialty by 10th graders (N = 788), %	7.2	14.6	26.9	3.0	24.0	19.3	3.3	1.6
Choice of specialty by 11th graders (N = 940), %	7.7	13.2	34.5	2.2	18.5	17.3	5.6	1.0
Choice of specialty by students of the 10th and 11th grades, depending on family income								
Lower than average income (there is not enough money even to buy food; there is only enough money to buy food); (N = 70)	5.7	14.3	22.9	7.1	27.1	20.0	2.9	0.0
Average income (there is enough money to buy necessary food and clothes, larger purchases have to be postponed); (N = 593)	8.6	12.8	29.5	2.9	20.4	19.4	4.9	1.5
High income (there is enough money to buy durable goods and not deny oneself anything); (N = 646)	7.6	14.1	32.8	2.2	19.3	18.4	4.6	0.9

Hum – humanities (linguistics and literary studies, history and archaeology, philosophy, ethics and religious studies, physical education and sports); Med – health and medical sciences; Eng – engineering, technology and technical sciences (architecture, informatics and computer engineering, electronics, photonics, nuclear energy and technology, weapons and weapon systems, etc.); Art – Arts and Culture; Nat – Mathematics and Natural Sciences (mathematics and mechanics, physics and astronomy, chemistry, biology); Soc – Social sciences (psychological sciences, economics and management, law, sociology and social work, political sciences and regional studies, mass media, etc.); Ped – education and pedagogical sciences; Agr – agriculture and agricultural sciences.
Source: own compilation according to the conducted survey.

Students were also asked about career choice factors *(Fig. 2)*.

In general, the three key factors in choosing an occupation include salary, career opportunities, and job content.

Admission to a specialty in a higher education institution

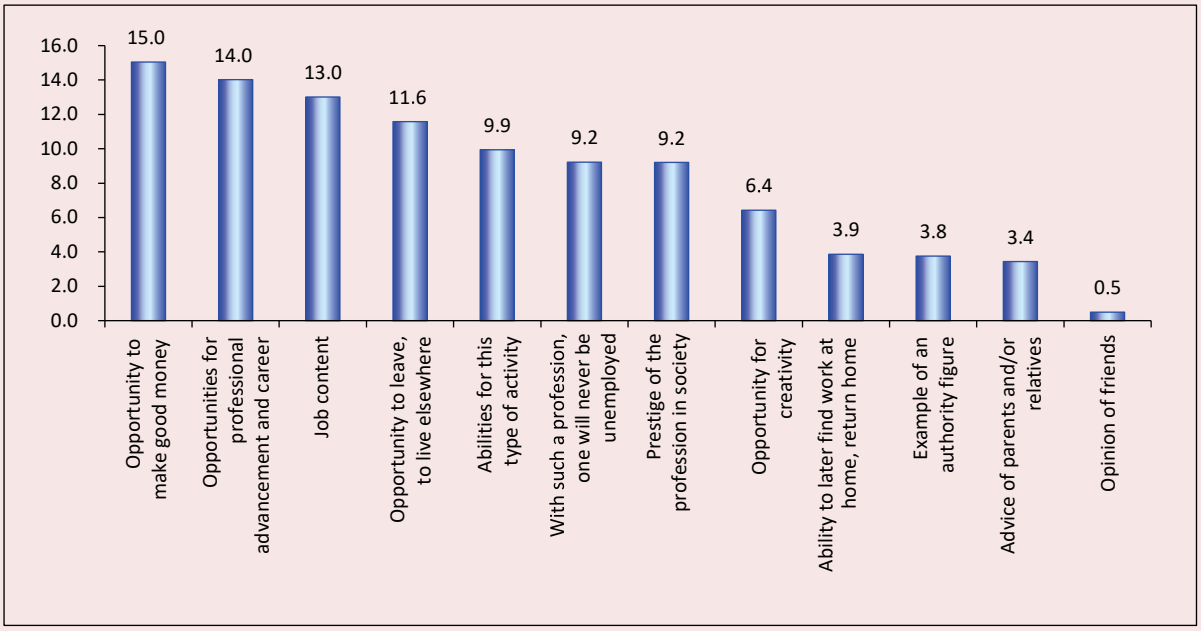
At this stage we can identify the last point of irrationality in the behavior of applicants: the application and enrollment in specialties not related to the choice of the USE subject and the initial desire.

The difference between the desire of school students to get a certain profession and reality can be determined by comparing the choice of specialties by students of 11th grades, who have decided to stay in the republic and enter the regional universities, according to the survey and the actual distribution of admission by training programs (considered admission for 2020, as data for 2021 are still being processed by the Ministry of Education and Science of the Republic of Bashkortostan).

The traditional public perception is that students choose "economics and law" rather than technical specialties. At first glance, the situation is reversed: the proportion of those who chose engineering specialties and actually enrolled is more than twice as high as the proportion for social specialties, for which expectations and reality virtually coincide. However, one must take into account the fact that the "engineering, technology and technical sciences" area includes 19 training programs, while the "social sciences" area includes only 7 training programs.

On average, students' expectations for the engineering specialties (enlarged direction "engineering, technology and technical science") are met, while for the social ones they are not. For example, when choosing engineering specialties, the level of salary is important for almost all respondents, and this expectation for this field is higher than

Figure 2. Factors influencing the choice of profession, according to respondents, %



Source: own compilation.

for all others. And it is reasonable, as the average salary for the employees of these specialties in the region is the maximum. At the same time, for those wishing to enter the enlarged field of "social sciences" (psychological sciences, economics and management, law, sociology, political sciences, etc.) the wage factor is also important (3rd place among all enlarged fields), but in fact the employees in this field receive wages 10% lower than the average for all eight presented fields *(Tab. 2)*.

The desire to enter the social sciences specialties is largely due to their "prestige" and "popularity", which is confirmed at the moment – of the top 30 most ranked specialties 18 are in economics and law. At the same time, the future prestige of most professions is questionable and was not assessed in this study.

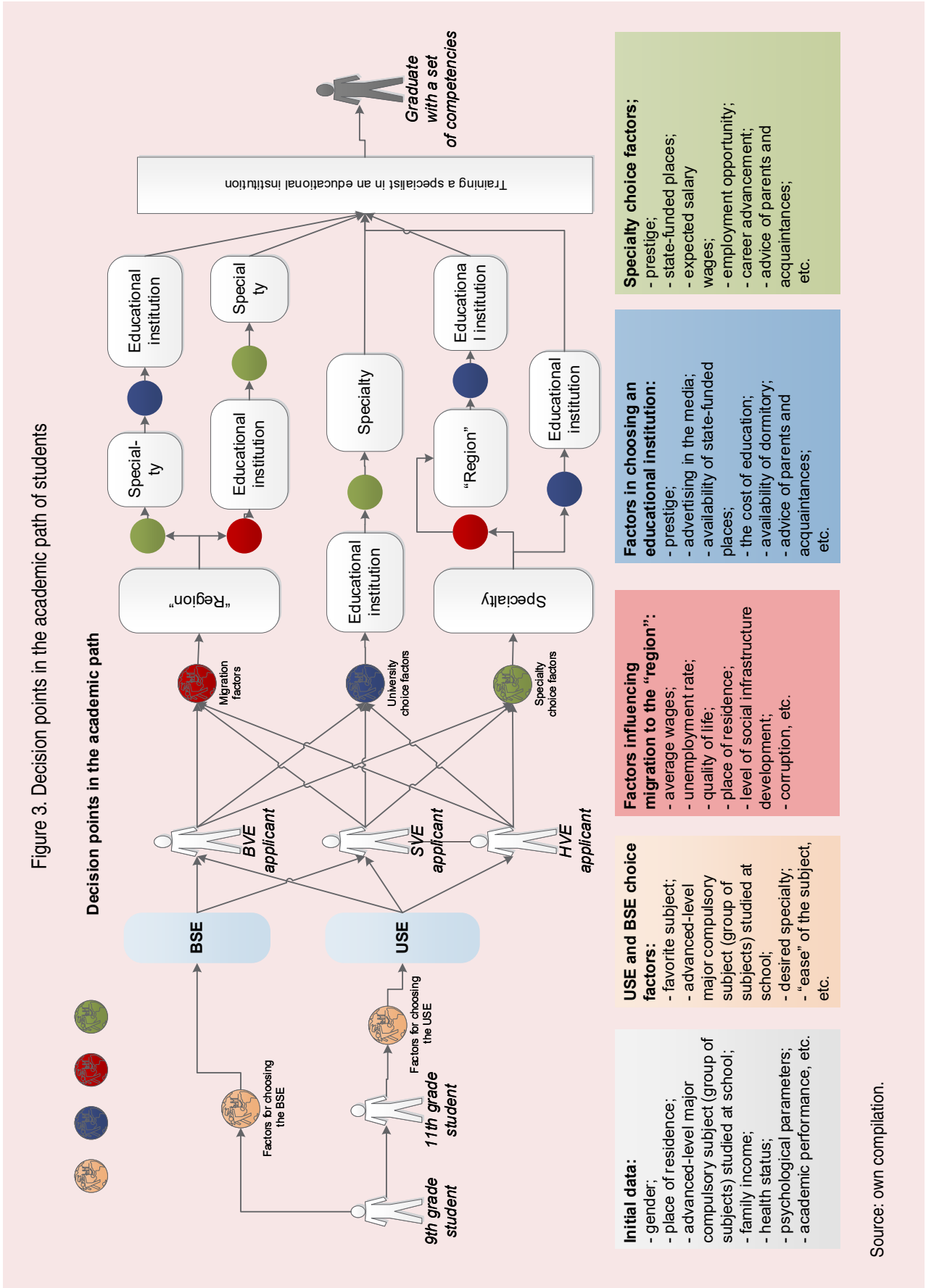
A significant number of students who want to study mathematics and the natural sciences (mathematics and mechanics, physics and astronomy, chemistry, biology) are changing their mind. This is partly due to the fact that students choose exactly those USE subjects that are necessary for admission to specialties in these areas: mathematics (advanced level) was planned to be passed by 74% of the surveyed 11th graders of the Republic of Bashkortostan, in fact 58% passed; physics – 30%, only 23% passed; computer science – 27%, in fact 19% passed.

Changes in choice are characteristic of "education and pedagogical sciences" (a change in the behavior of applicants led to an increase in the proportion of choice and actual admission by half), "agricultural sciences" (an increase of three times), "humanities" (an increase of two times). In the first two cases, the change in choice can be explained by the number of state-funded places allocated to these areas (1st and 2nd place among all the enlarged areas in the Republic of Bashkortostan).

Table 2. Results of a survey of students on the choice of education specialty, 2021

Enlarged training area	Choice[1], %	Actual enrollment[2], %	Factor influencing the choice of specialty					
			Wage level		State-funded places		Popularity / prestige	
			Expect[3], %	Act[4], rub	Expect[5], %	Act[6], units	Expect[7], %	Act[8], units
Nat	18.5	5.1 (6)	75.0	34,759	83.5	146	62.5	1
Eng	34.5	38.1 (19)	82.4	38,986	89.8	221	66.6	7
Med	13.2	8.5 (3)	65.7	29,597	92.0	235	69.1	2
Agr	1.0	3.2 (2)	61.8	23,366	89.3	253	38.2	0
Soc	17.3	17.3 (7)	73.7	29,170	83.4	70	63.5	18
Ped	5.6	11.5 (12)	48.4	28,386	92.4	1,596	59.0	1
Hum	7.7	15.2 (15)	59.4	29,110	85.8	41	56.1	1
Art	2.2	1.0 (1)	55.6	26,044	76.5	32	47.5	1

[1] The choice of specialties by 11th graders planning to study in the Republic of Bashkortostan. (N = 940).
[2] Actual admission to full-time, part-time, extramural bachelor's and specialist programs in the Republic of Bashkortostan, 2020.
[3] Students' expectations were defined as the sum of the proportions of "strongly" and "very strongly" responses for the factor "the expected level of wages" for graduates of a given specialty when choosing each specialty.
[4] The actual values were determined as the average salaries in the region by training programs, obtained with the help of the match matrix "VED-Training programs", compiled by the authors.
[5] The expectations of students were defined as the sum of the proportions of responses "important" and "very important" for the factor "anticipated number of state-funded places" when choosing each of the specialties.
[6] The actual values were defined as state-funded places per training program in the Republic of Bashkortostan in 2020.
[7] The expectations of students were defined as the sum of the proportions of responses "important" and "very important" for the factor "anticipated number of state-funded places" when choosing each of the specialties.
[8] The actual values were determined by the number of specialties from the top 30 ranking specialties of universities in Russia in 2020. Available at: https://moeobrazovanie.ru/specialities_rating_vuz/.
Source: the results of the survey and official statistics.



Source: own compilation.

In lieu of a conclusion

The widespread digitalization, the rapidly changing labor market and the long-term demand for a whole layer of specialties, the COVID-19 pandemic, which has affected the quality of education and uncovered many problems – these and other factors are once again drawing attention to the training system. The behavior of applicants is also changing: the increase in the amount of available information about the quality of education in Russian universities and career prospects, the availability of Internet resources that provide recommendations for admission based on the personal preferences of the applicant, the opportunity to get an education at any university in the world without leaving home, combined with the demographic decline determine new factors of the struggle of universities/cities/regions for the future human capital.

As a result of the study we have revealed three irrational points in the academic paths of applicants in the Republic of Bashkortostan: 1) choosing "easy" humanities and economic specialties as the USE subject, not allowing to enter the desired in-demand specialty; 2) desire to enter "promising specialty" not related to the chosen USE subject; 3) application and admission to specialties not related to the chosen USE subject and the initial desire.

The conclusions from the survey of students in the Republic of Bashkortostan are typical of most regions that have their own educational potential, which is not attractive to local applicants. Formally, they confirm the hypotheses that by the end of schooling students change their choice from the subjects that they need to enter their desired specialty to the "easier" ones. Accordingly, the range of specialties for which they can enter is narrowed and applicants enter where they are able to enter (availability of state-funded places, low cost of education, etc.). Considering that the very set of current specialties in most universities (especially in the regions) is rapidly becoming obsolete and there is already a demand in the market for specialists who are not trained in universities. This, obviously, will affect the strengthening of the disproportion between the labor market and educational services.

In general, in conducting further research on the behavior of applicants, it is advisable to pay attention to two aspects.

1. Modeling and forecasting the behavior of applicants.

In methodological terms, the socio-economic and educational causes of irrationality in the behavior of applicants choosing an academic path *(Fig. 3)* can be assessed on the basis of *simulation modeling*.

The most preferred tool for scenario experiments to predict the choice of specialty and the level of educational migration is *agent-based modeling*. It is based on the formation of agent groups interacting with each other and with the external environment, possessing the properties of autonomy, heterogeneity, limited intelligence and location in space (Makarov et al., 2020). This type of modeling is based on the simulation of the development of socio-economic and educational systems, in which their overall dynamics are determined by the interaction of a set of private agents (applicants) (Makarov et al., 2016). The implementation of a comprehensive agent-based model of the regional educational system will allow computational experiments to assess the impact of various mechanisms of state influence on the agents' (applicants') behavior in order to reduce the imbalance between the labor markets and educational services (Gainanov et al., 2020).

2. Guidance counseling.

Part of the professional-qualification imbalance in the labor markets and educational services of the region is formed as a result of the guidance counseling carried out by the authorities. In the Republic of Bashkortostan, as well as in other constituent entities of the Russian Federation, quite a lot of guidance counseling is currently carried out. In the region it is practiced to create specialized classes of universities on the basis of schools (M.S. Pinsky Engineering Lyceum 83 at USPTU; pre-university schools, 5 basic schools of RAS, USPTU Youth Technopark, etc.) (Khusainova, Konnova, 2019). Nationwide guidance counseling events are held.

Schools implement activities dedicated to self-determination of students: quizzes, tests, various thematic games. In the current survey, students of the Republic of Bashkortostan were asked what guidance counseling activities are carried out at school. Among those surveyed 64.4% noted conversations about the professions, 38.4% attended open house at various educational institutions, 28.1% – activities related to meeting with representatives of various professions, 24.4% – days of guidance counseling for young people, 21.8% – independently studied information materials of educational institutions, 18.3% – took a tour of the city's enterprises, 13.6% – named parties, competitions, quizzes. Only 5% of respondents said that such activities do not take place in their school.

However, students actually learn about universities and specialties from social media (39.0% according to the survey), television commercials (30.0%), from university employees who come to school (22%), and only 8% through tours during open house days.

It is necessary to take into account the characteristics of today's "digital" youth (Generation Z), so new directions of guidance counseling should be associated with the creation of "trend content" in social networks and the media, the launch of social videos aimed at raising the prestige of professions and professions in demand in the regions. Also, of particular interest to today's applicants are practice-oriented and interactive methods of guidance counseling: plans to visit companies in the city, virtual tours of universities, physical and virtual sites for guidance counseling, Internet resources for guidance counseling. All of the above activities should be regular and systematic.

Thus, the irrationality of the applicant's behavior in a difficult situation of multi-parameter choice of training program and higher education institution is one of the causes of imbalance in the labor market and educational services in the region. At the same time, monitoring the labor market and forecasting staffing needs are general economic tasks, which obviously cannot and should not be solved only by the efforts of schools or universities, it is a region-wide problem of human capital formation. The task of regional state authorities is to minimize the professional-qualification imbalance, not only for the current moment, but also for the long term.

References

Baldanov V.D., Dondokova E.B. (2015). Models of rationality in the individual's behavior and choice of majors of study in universities. *Vestnik Buryatskogo gosudarstvennogo universiteta=The Buryat State University Bulletin,* 2S, 3–8 (in Russian).

Gainanov D.A., Migranova L.I. (2013). Agent-oriented approach to the balanced interaction of the labor market and the education market. *Fundamental'nye issledovaniya=Fundamental Research,* 8(2), 394–398 (in Russian).

Gainanov D.A., Migranova L.I., Minyazev A.I. (2020). Digital model of the applicant's behavior in the educational environment. *Iskusstvennye obshchestva=Artificial Societies,* 15(4), 6. DOI: 10.18254/S207751800011658-2 (in Russian).

Koksharov V.A., Agarkov G.A. (2015). Analysis of economic motivation when individuals choose an educational path. *Ekonomika regiona=Economy of Region,* 1(41), 245–252 (in Russian).

Makarov V.L., Bakhtizin A.R., Sushko E.D. (2020). Agent-based model as a tool for controlling environment of the region. *Zhurnal Novoi ekonomicheskoi assotsiatsii=Journal of the New Economic Association,* 1(45), 151–171 (in Russian).

Makarov V.L., Bakhtizin A.R., Sushko E.D. (2016). Agent-based models as a means of testing of management solutions. *Upravlencheskoe konsul'tirovanie=Administrative Consulting,* 12(96), 16–25 (in Russian).

Maksimov A.G., Telezhkina M.S. (2019). Econometric analysis of phenomenon of higher education expansion. *Prikladnaya ekonometrika=Applied Econometrics,* 55, 91–112. DOI: 10.24411/1993-7601-2019 10012 (in Russian).

Mel'nikov R.M. (2018). Evaluation of economic consequences of the choice of educational field in modern Russian conditions. *Prikladnaya ekonometrika=Applied Econometrics,* 49, 30–56 (in Russian).

Khusainova I.A., Konnova O.A. (2019). Improvement of professional orientation work of higher education institutions of the Republic of Bashkortostan on the results of the 2018 reception campaign. *Vestnik UGNTU. Nauka, obrazovanie, ekonomika. Seriya: Ekonomika=Bulletin USPTU. Science, Education, Economy. Series Economy,* 1(27), 121–129 (in Russian).

Alm J., Winters J. (2009). Distance and intrastate college student migration. *Economics of Education Review,* 28, 728–738.

Black S.E., Cortes K.E., Lincove J.A. (2018). Apply yourself: Racial and ethnic differences in college application. *Education Finance and Policy,* 9169.

Bordón P., Canals C., Mizala A. (2020). The gender gap in college major choice in Chile. *Economics of Education Review,* 77, August, 102011.

Broecke S. (2015). University rankings: Do they matter in the UK? *Education Economics*, 23(2), 137–161.

Cooke T.J., Boyle P. (2011). The migration of high school graduates to college. *Educational Evaluation and Policy Analysis,* 33, 202–213.

Cullinan, J., Duggan J.A (2016). School-level gravity model of student migration flows to higher education institutions. *Spatial Economic Analysis,* 11(3), 294–314.

Delaney J.M., Devereux P.J. (2020). Choosing differently? College application behavior and the persistence of educational advantage. *Economics of Education Review,* 77, 101998.

Faggian A., Franklin R.S. (2014). Human capital redistribution in the USA: The migration of the college-bound. *Spatial Economic Analysis,* 9, 376–395.

Gerard D. (1956). Market equilibrium. *Proceedinqs of the National Academy of Sciences,* 42, 876–878.

Gibbons S., Vignoles A. (2012). Geography, choice and participation in higher education in England. *Regional Science and Urban Economics,* 42, 98–113.

Kahneman D., Tversky A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica,* 47(2), 263.

Spiess C.K., Wrohlich K. (2010). Does distance determine who attends a university in Germany? *Economics of Education Review,* 29, 470–479.

Suhonen T. (2014). Field-of-study choice in higher education: Does distance matter? *Spatial Economic Analysis,* 9, 355–375.

Information about the Authors

Damir A. Gainanov – Doctor of Sciences (Economics), Professor, director, Institute for Social and Economic Research, Ufa Federal Research Center of the Russian Academy of Sciences (71, Oktyabrya Avenue, Ufa, 450054, Russian Federation; e-mail: 2d2@inbox.ru)

Aisylu G. Ataeva – Candidate of Sciences (Economics), Senior Researcher, Institute for Social and Economic Research, Ufa Federal Research Center of the Russian Academy of Sciences (71, Oktyabrya Avenue, Ufa, 450054, Russian Federation; e-mail: Ice_lu@mail.ru)

Liliya I. Migranova – Candidate of Sciences (Economics), Senior Researcher, Institute for Social and Economic Research, Ufa Federal Research Center of the Russian Academy of Sciences (71, Oktyabrya Avenue, Ufa, 450054, Russian Federation; e-mail: lilya2710@yandex.ru)

Alsu R. Atnabaeva – Researcher, Institute for Social and Economic Research, Ufa Federal Research Center of the Russian Academy of Sciences (71, Oktyabrya Avenue, Ufa, 450054, Russian Federation; e-mail: alsouy@mail.ru)

Received November 15, 2021.