SILESIAN UNIVERSITY OF TECHNOLOGY PUBLISHING HOUSE

SCIENTIFIC PAPERS OF SILESIAN UNIVERSITY OF TECHNOLOGY 2025
ORGANIZATION AND MANAGEMENT SERIES NO. 216

FACTORS INFLUENCING APPLICATIONS PER SPOT IN HIGHER EDUCATION: EXAM RESULTS, AGE, AND STRATEGIES

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Purpose: The study aims to identify key factors influencing the number of applications per spot in undergraduate and integrated master's programs, focusing on high school exam results, candidate age, and application strategies. The research provides insights to optimize university recruitment policies.
Design/methodology/approach: The research employs a quantitative approach based on statistical analysis of data from university admission records. Methods include descriptive statistics, linear regression models, and t-tests to examine the relationships between high school exam results, candidate age, and the number of applications per spot. The study also leverages Power BI tools to visualize and prioritize key factors influencing application trends.
Findings: The study revealed that mathematics and English high school exam results significantly influence the number of applications per spot, with mathematics having a stronger impact. Younger candidates (<20 years) demonstrated more active application strategies, submitting multiple applications, which increased the average number of applications per spot. The findings also emphasize the diversity in application trends based on candidate age and academic performance.
Research limitations/implications: The study is limited to data from a single university in Poland, which may affect the generalizability of the findings to other institutions or countries. Future research could expand the analysis to include multiple universities or international contexts. Additionally, incorporating qualitative methods could provide deeper insights into candidate motivations and application strategies.
Practical implications: The study primarily contributes to understanding application behaviors in university recruitment. While its direct practical implications are limited, findings could help universities refine recruitment strategies and support programs.
Social implications: The study primarily focuses on university recruitment processes, with limited direct societal impact. However, its findings could support policies promoting inclusivity in higher education.
Originality/value: The paper offers a novel perspective on university recruitment by integrating high school exam results, candidate age, and application strategies into a comprehensive analysis. It provides valuable insights for university administrators and policymakers aiming to optimize recruitment strategies and enhance inclusivity.
Keywords: higher education admissions, number of applications per spot, high school exam results, candidate application strategies, candidate age.
Category of the paper: Research paper.

1. Introduction

The popularity of higher education has significantly increased in recent decades, particularly in developed countries. The expansion of access to university education and the growing societal awareness of its economic and social benefits have led an increasing number of young people to pursue further education after high school. As a result, the recruitment process for higher education has become more competitive, and the number of applications per spot has become a key indicator of a university's popularity and selectivity. This phenomenon has gained prominence in the context of the growing number of applications to prestigious institutions, often viewed as gateways to better career and social opportunities.

In the field of higher education, particular attention is given to studies focusing on candidates' choices of study programs and their behaviors during the application process. Analyzing candidates' decisions provides deeper insight into the mechanisms shaping the popularity of specific academic fields, as well as the motivations behind these choices. These decisions are often correlated with expectations regarding future careers, salaries, and professional prestige. At the same time, individual factors such as academic performance, the age of applicants, and the availability of information about offered programs play a significant role. Understanding these relationships is crucial for developing effective recruitment strategies and tailoring educational offerings to candidates' needs.

The recruitment process for higher education is becoming increasingly complex due to changing educational requirements and evolving societal expectations of candidates. The growing number of applications to universities, particularly the most prestigious ones, highlights the rising importance of educational quality and academic prestige in candidates' application decisions. The number of applications per spot is not only an indicator of institutional popularity but also a measure of the selectivity of the recruitment process.

This study offers a novel perspective on university recruitment by integrating candidates' high school exam results, age, and application strategies into a comprehensive analysis. Unlike prior research, this work identifies specific threshold scores in Mathematics and English that significantly influence application behaviors, providing actionable insights for recruitment policies. The findings contribute to the existing literature by exploring the diverse strategies employed by candidates of different age groups, highlighting underexamined trends in higher education admissions. These considerations make this research particularly relevant for scientific journals focusing on educational management and policy.

2. Analysis of previous research

2.1. Academic performance as a decision-making factor

One of the most important factors influencing the number of applications per spot is candidates' academic performance. Research conducted by Reardon, Baker, and Klasik (2012) indicates that students with high school and test scores are more likely to apply to selective universities, thereby increasing the number of applications per spot at these institutions. Espenshade and Radford (2009) emphasize that elite universities attract candidates with the highest academic achievements, which translates into greater competitiveness. Academic performance not only serves as an indicator of academic potential but also reflects the ability to handle the demands of higher education.

The "test-optional" policy has created new opportunities for candidates. As noted by Hossler et al. (2020), allowing applicants to choose whether to submit SAT or ACT scores has increased the number of applications, particularly among candidates with lower test scores. Belasco et al. (2015) demonstrated that this policy has contributed to greater demographic diversity among applicants, attracting individuals who previously lacked access to adequate educational resources.

2.2. Age of applicants

The age of candidates also influences their application behaviors. Younger applicants, often without professional experience, tend to submit more applications in an effort to increase their chances of admission (Tinto, 2012). Older applicants, who usually have work experience, approach the selection of programs and universities more selectively, resulting in fewer applications per spot in this group (Grodsky, Jones, 2007). Older applicants often choose study programs that align with their professional needs, which sets them apart from younger candidates who are more frequently guided by social aspirations and expectations.

2.3. Other factors influencing the number of applications

The location of a university, its academic prestige, education costs, and the availability of financial support are equally significant factors. Marginson (2006) highlights that globalization and the growing number of international students contribute to increased competition at prestigious universities. At the same time, internet marketing plays an increasingly important role in candidates' application decisions, particularly in Poland, where universities are beginning to utilize social media and digital tools more effectively (Kisiołek, 2020).

Numerous other academic publications address this topic. For example, Black et al. (2020) analyze how racial and ethnic differences influence candidates' application behaviors in the United States, identifying factors such as academic performance and demographic constraints. Murphy and Wyness (2020) examined the impact of predicted grades on the application decisions of disadvantaged candidates, noting that incorrect predictions can lead to mismatches between applications and actual achievements. Estevan et al. (2019) studied the effects of an affirmative action program in Brazil, demonstrating that such policies improve access to higher education for disadvantaged groups while minimizing negative impacts on academic outcomes.

Marcinkowski et al. (2020) explored the ethical implications of using artificial intelligence in recruitment processes, revealing that algorithms can both support and limit equitable access to education. Bordón et al. (2020) analyzed the influence of gender on the choice of study programs in Chile, showing that these differences are linked to societal expectations and stereotypes. Bravo and Nistor (2022) examined the acceptance of technology in quality management in higher education, emphasizing the role of demographic factors such as age and gender in adopting new tools. Michel et al. (2019) provided a systematic review of the literature, identifying key factors influencing recruitment decisions, such as academic performance and motivational letters. Yusoff (2019) assessed the effectiveness of "mini-interviews" as a recruitment tool in higher education, demonstrating that this method minimizes gender and demographic biases. Finally, Rusanen et al. (2019) investigated students' motivations for choosing STEM fields and the relationship between mathematics selection and university admission, underscoring the critical role of math performance in the recruitment process.

2.4. Summary of previous research

The analysis of previous research indicates that the number of applications per spot depends on various factors, such as academic performance, candidate age, recruitment policies, and university promotional strategies. Understanding these relationships enables better alignment of educational offerings with societal and economic needs, as well as more effective management of the recruitment process. Research in this area is crucial for the development of higher education. Recommendations from these analyses can contribute to designing more effective recruitment strategies and improving access to higher education for diverse groups of candidates.

However, previous studies have not addressed the following topics:

1. The influence of the number of applications per spot in the context of results in specific high school subjects, such as mathematics, English, and Polish, with consideration of different score ranges.

2. The role of candidate age in decision-making regarding the number of applications and the competitiveness of the recruitment process, particularly among candidates over the age of 20.
3. The differentiation in application strategies among candidates submitting multiple applications, especially in relation to their scores and the prestige of selected programs.

The author believes that addressing these topics will positively contribute to expanding the available knowledge on university recruitment processes and enhancing the efficiency of management in higher education institutions.

Based on the conducted analysis, the **primary objective of this study** is to identify key factors influencing the number of applications per spot in undergraduate and integrated master's programs, with particular emphasis on academic performance, candidate age, and application strategies, as well as to evaluate their impact on recruitment processes across different candidate segments.

The subject of this study is the recruitment process for undergraduate and integrated master's programs, with a focus on key factors affecting the number of applications per spot, such as high school exam results, candidate age, and application strategies.

The author proposes the following **research hypotheses**:

H1. Exam results in mathematics and English are key factors influencing the number of applications per spot.

H2. Younger candidates are more likely to submit multiple applications to different programs, thereby increasing the average number of applications per spot.

3. Research methods and tools

The study was conducted based on statistical data from the University of Warmia and Mazury in Olsztyn for the academic years 2018/2019-2023/2024. The initial dataset included 92,678 recruitment applications. After eliminating unpaid applications, applications from candidates without completed high school exams, and applications for second-cycle programs, 77,348 applications were included in the analysis. Applications for second-cycle programs were excluded because the study focused solely on high school exam results, which are the basis for recruitment to undergraduate and integrated master's programs. The final dataset covered 17 faculties and 94 programs.

The analysis included high school exam results in English, mathematics, and Polish, as these are mandatory subjects for all candidates taking the exam. Their results thus provide a unified benchmark for assessing the general level of candidates' preparedness, regardless of additional subjects chosen or study programs selected.

The following software was used for the study:

- Data preprocessing, integration, and cleaning – MS Excel 365 (with the Power Query add-in).
- Data visualization – MS Excel 365, Power BI Desktop (version 2.138.1452.0).
- Statistical analyses – IBM SPSS Statistics (version 29.0.0.0).

The selection of these tools enabled a comprehensive approach to data processing, detailed statistical analyses, and visualizations.

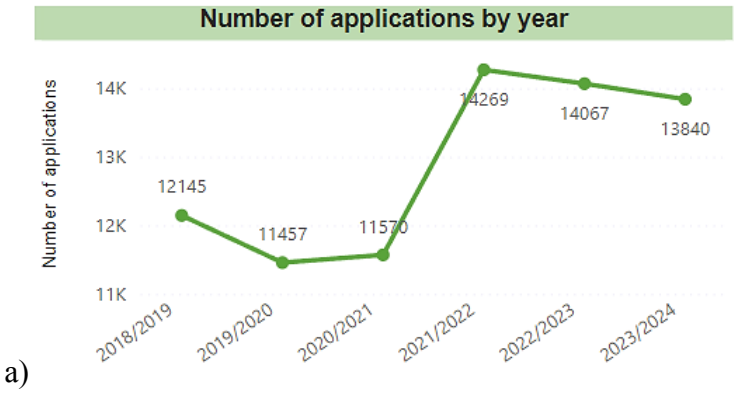
The following tools and statistical methods were applied during the study:

- Correlation analysis – used to determine the relationships between variables such as high school exam results, candidate age, and the number of applications per spot. These methods allowed the identification of the strength and direction of these relationships.
- Multivariate modeling – conducted using Power BI's "Key Influencers" tool, which allows for the hierarchical ranking of variables based on their impact on the dependent variable (number of applications per spot).
- Descriptive statistics – used to characterize the dataset, including measures such as means, standard deviations, and distributions, to better understand the sample.
- Linear regression analysis – applied to verify Hypothesis H1, determining the influence of mathematics and English exam results on the number of applications per spot.
- T-test for two groups – conducted to verify Hypothesis H2, comparing the average number of applications between younger and older candidates.

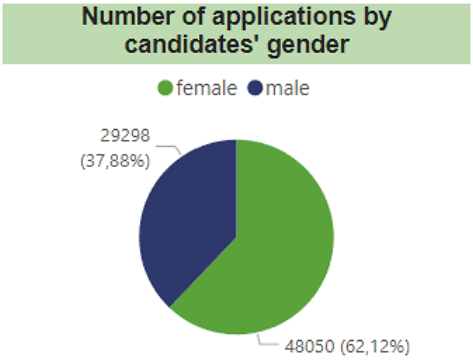
3.1. Characteristics of the research sample

The research sample analyzed in this study included recruitment data from the academic years 2018/2019-2023/2024. The key features of the sample are presented below:

1. Number of applications over time: The number of recruitment applications varied significantly during the analyzed period. After an initial decline from 12,145 applications in 2018/2019 to 11,457 in 2019/2020, an increase was observed, peaking at 14,269 applications in 2021/2022. In subsequent years, there was a slight decrease, reaching 13,840 applications in 2023/2024 (Figure 1a).
2. Number of applications by gender: Women accounted for 62.12% of all applications (48,050), while men represented 37.88% (29,298). The significant predominance of women in the application structure indicates a greater interest among female candidates in studying at the University (Figure 1b).



a)



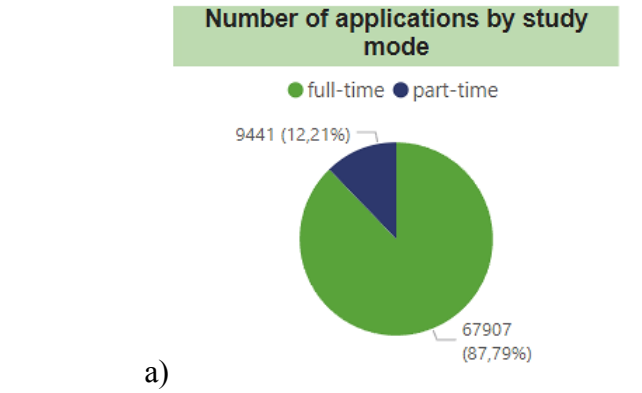
b)

Note. The figure consists of two parts. Part (a) shows the total number of applications submitted to the university over the analyzed years, while part (b) breaks down the data by gender. The figure highlights the predominance of female candidates across all years and illustrates the overall trends in application numbers, including periods of growth and decline.

Figure 1. Number of applications by year and gender.

Source: Own study.

3. Form of Studies: Full-time studies were the preferred form of education, accounting for 87.79% of applications (67,907). Part-time studies, on the other hand, attracted 12.21% of applications (9,441), confirming the dominant role of full-time programs in the university's offerings (Figure 2a).
4. Type of Completed School: The vast majority of candidates graduated from general secondary schools (77.85% of applications, 60,218), while a significantly smaller proportion came from technical schools (20.96%, 16,212). Applications from specialized secondary schools were marginal (1.19%, 918) (Figure 2b).



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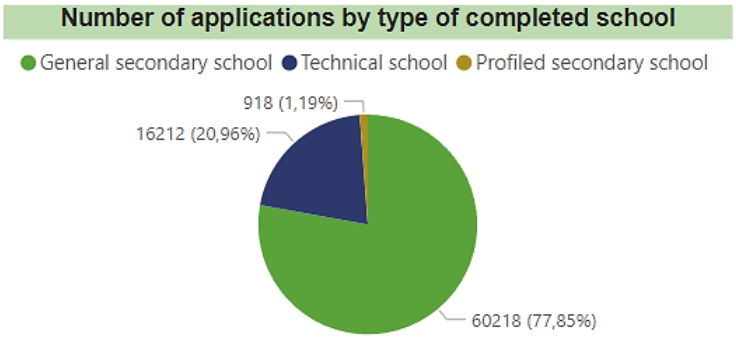


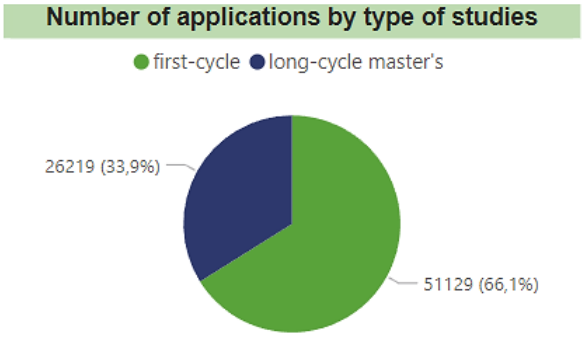
b)

Note. The figure consists of two parts. Part (a) displays the number of applications by form of study, distinguishing between full-time and part-time programs. Part (b) presents the distribution of applications based on the type of secondary school completed by candidates. The figure emphasizes the dominance of full-time studies and the significant proportion of candidates graduating from general secondary schools.

Figure 2. Number of applications by form of study and type of completed school.

Source: Own study.

5. Type of Studies: Undergraduate programs were the most frequently chosen by candidates (66.1% of applications, 51,129), while integrated master's programs accounted for 33.9% of applications (26,219) (Figure 3).



Note. The figure illustrates the distribution of applications by type of study, distinguishing between undergraduate and integrated master's programs. It highlights the predominance of applications for undergraduate programs, reflecting their greater popularity among candidates.

Figure 3. Number of applications by type of study.

Source: Own study.

The above characteristics indicate the diversity of the sample in terms of both the form and type of studies as well as the demographic features of the candidates. Notably, attention should be drawn to the predominance of women among the candidates and the dominance of general secondary school graduates in the application structure.

4. Results of scientific analysis

After collecting and preparing the source data, the first stage of analysis involved determining descriptive statistics. Their application provides insights into the general trends and diversity of the studied sample. These statistics are presented in Table 1.

The characteristics shown in Table 1 highlight:

- Diversity in English scores: High variability in results may indicate differing levels of preparation among candidates in this subject.
- Asymmetry in mathematics and Polish scores: The results suggest that many candidates achieve scores close to the lower end of the distribution.
- Variability in total points: A wide range in total scores points to significant differences in candidate levels.
- Role of candidate age: The presence of older candidates in the sample may indicate specific educational needs within this group.

Table 1.
Descriptive statistics

Characteristic	English	Mathematics	Polish	Total points	Candidate age
Mean	103.25	67.87	70.13	260.78	19.63
Standard Error	0.19	0.10	0.11	0.37	0.01
Median	94	65	63	250	19
Mode	0	62	60	212	19
Standard Deviation	53.05	27.07	29.46	102.89	3.04
Sample Variance	2,814.65	732.89	867.78	10,586.19	9.24
Kurtosis	-0.87	2.22	3.00	-0.46	45.71
Skewness	0.06	0.97	1.59	0.30	5.76
Range	200	200	200	600	65
Minimum	0	0	0	0	16
Maximum	200	200	200	600	81
Sum	7,986,435.20	5,249,760.50	5,424,253.70	20,096,074.30	1,518,718.00
Count	77,348	77,348	77,348	77,061	77,348

Note. The table presents descriptive statistics for key variables analyzed in the study, including exam scores in English, Mathematics, and Polish, as well as total scores and candidate age. The statistics include measures of central tendency (mean, median, mode), variability (standard deviation, variance, range), and distribution characteristics (skewness, kurtosis). These metrics provide insights into the diversity of candidates' academic performance and demographic characteristics.

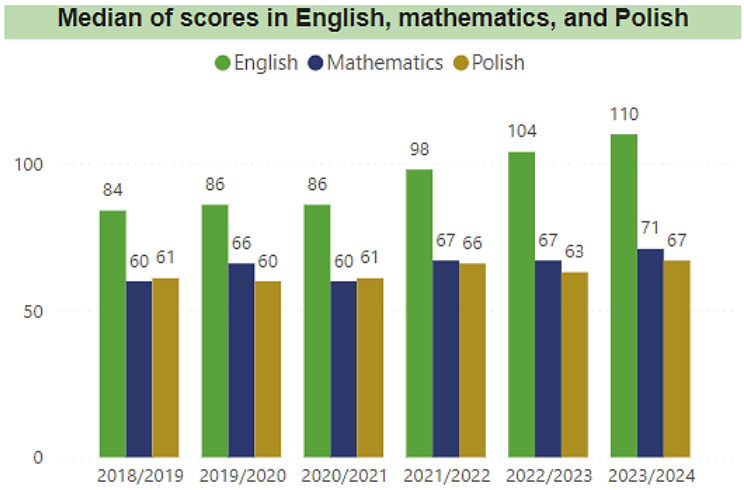
Source: Own study.

The identified characteristics and relationships, such as the diversity of results, asymmetries in distributions, and the specific needs of older candidates, require further investigation to better understand the mechanisms influencing application decisions and recruitment strategies.

After conducting descriptive statistics, the author deemed it purposeful to analyze the dynamics of high school exam results, enabling a general assessment of candidates' preparedness over the years. Median was chosen as the measure of central tendency for this analysis due to its greater resistance to outliers, which may occur in exam results and distort the true picture of candidates' preparedness when using the mean.

The chart in Figure 4 presents the median high school exam results in English, mathematics, and Polish for the academic years 2018/2019–2023/2024.

1. English: The median English scores systematically increased over the analyzed period, from 84 points in 2018/2019 to 110 points in 2022/2023, followed by a slight decline to 104 points in 2023/2024. This growth indicates improved preparation among candidates in this subject.
2. Mathematics: Mathematics scores were characterized by stability over the analyzed period, with the median ranging between 60 and 67 points. The lack of significant fluctuations suggests a relatively constant level of candidates' skills in this area.
3. Polish: The median Polish scores also remained consistent, ranging between 60 and 71 points. In recent years (2022/2023-2023/2024), a slight increase was observed, which may indicate improved preparation in this subject.



Note. The figure shows the median results of high school exams in English, Mathematics, and Polish across the analyzed academic years. It highlights the upward trend in English exam results and the relative stability of results in Mathematics and Polish, providing insights into the changes in candidates' academic preparedness over time.

Figure 4. Median high school exam results compared to the number of applications.

Source: Own study.

Based on the above, the following conclusions can be drawn:

- English stands out compared to the other subjects, both in terms of higher scores and its noticeable upward trend.

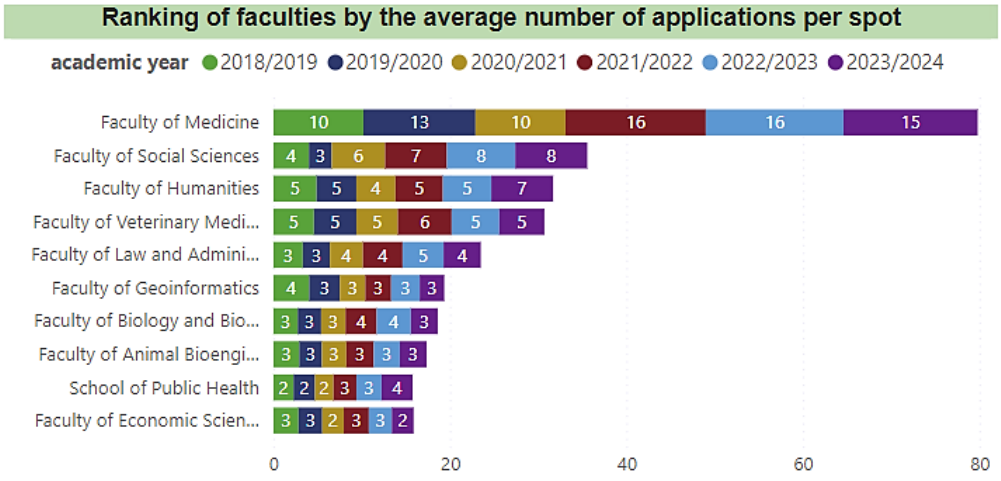
- Mathematics and Polish exhibit greater stability in their median scores, which may result from smaller changes in curricula or other educational factors.
- The analysis of median scores allows for detailed comparisons of candidates' preparedness across different areas, providing a basis for further research into the causes of observed trends.

In the next stage of the scientific investigation, the author analyzed the popularity of faculties and programs among candidates. This popularity was measured not by the total number of applications for a specific faculty or program but by the number of applications per spot. According to the author, considering only the total number of applications would not accurately reflect actual popularity, as this figure largely depends on the available number of spots in a given program. A more realistic view can be obtained by analyzing the number of applications per spot.

The charts presented in Figures 5 and 6 show the rankings of faculties and programs based on the average number of applications per spot in individual academic years. This analysis provides a better understanding of trends in popularity among candidates over time.

The data shown in Figure 5 reveal the following patterns:

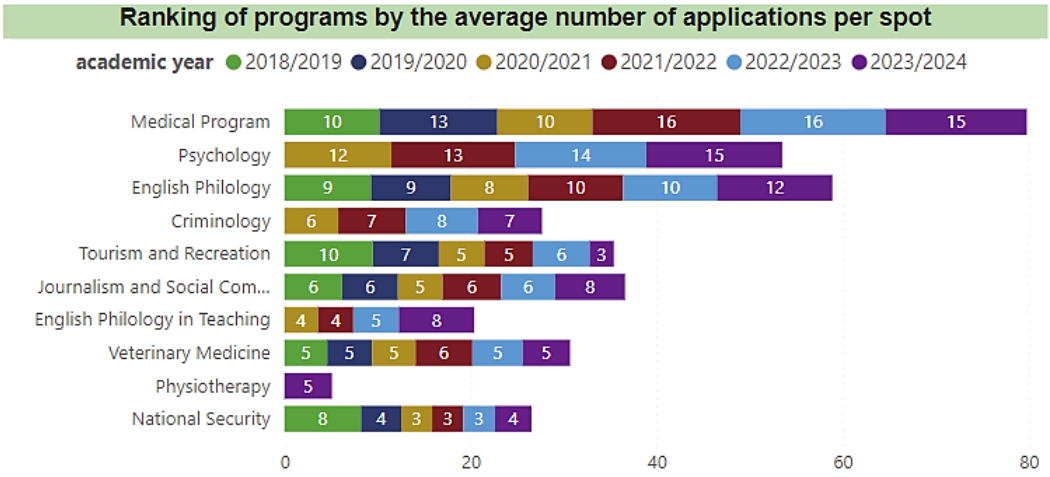
1. Most Popular Faculties:
   - The Faculty of Medicine consistently enjoyed the highest popularity throughout the analyzed period, with an average number of applications per spot ranging from 10 in 2018/2019 to 16 in 2021/2022-2022/2023, and 15 in 2023/2024. The high number of applications may stem from the prestige of the medical profession and the limited number of spots available.
   - The Faculty of Social Sciences ranked second in most years, peaking in popularity in 2021/2022 with 8 applications per spot.



Note. The figure shows the average number of applications per spot across faculties during the analyzed years. It highlights the consistent popularity of the Faculty of Medicine, which ranks highest, and contrasts it with the lower interest in other faculties.

Figure 5. Popularity of faculties among university applicants.

Source: Own study.



Note. The figure illustrates the average number of applications per spot for the most popular study programs during the analyzed years. It highlights the dominance of the Medical Program, followed by Psychology, and provides a comparative view of candidate interest in various fields of study.

Figure 6. Popularity of study programs among candidates.

Source: Own study.

2. Variability in the Popularity of Other Faculties:
   - The Faculty of Humanities and the Faculty of Veterinary Medicine maintained stable positions in the middle of the ranking, with the number of applications per spot ranging from 5 to 7 across different years.
   - Other faculties, such as the Faculty of Economic Sciences and the School of Public Health, recorded the lowest number of applications per spot (2-3 applications), indicating lower interest among candidates.
3. Trends Over Time:
   - The high stability in the popularity of the Faculty of Medicine reflects consistent interest in this field of study, despite changes in the overall educational market.
   - Faculties with fewer applications (e.g., the Faculty of Economic Sciences) exhibited similar results across all years, possibly due to the specific nature of their educational offerings.

The observed patterns allow for the following conclusions:

- The analysis of the average number of applications per spot highlights significant differences in the popularity of individual faculties, which may result from both the prestige of offered programs and the specific expectations of candidates.
- The Faculty of Medicine dominates the ranking, reflecting strong interest in medical education.
- Lower interest in certain faculties suggests a need to analyze their educational offerings and marketing strategies to enhance their competitiveness among candidates.

The next chart illustrates the popularity of the ten most in-demand study programs. The University offers a highly diverse range of 94 programs, but only some attract significant interest from candidates. The data presented in Figure 6 reveal the following:

1. Most Popular Programs:
   - The Medical Program clearly dominates throughout the analyzed period, with the number of applications per spot ranging from 10 in 2018/2019 to 16 in 2021/2022-2022/2023, and 15 in 2023/2024. This high popularity may result from the prestige of the program and the limited number of available spots.
   - Psychology ranks second in most analyzed years, with applications per spot ranging from 12 in 2018/2019 to 15 in 2022/2023. The growing interest in this program may be linked to the increasing demand for specialists in this field.
2. Language Programs:
   - Programs such as English Philology and English Philology with Foreign Languages maintain stable positions in the ranking, with applications per spot ranging from 8 to 12. Their popularity may be attributed to the demand for language skills in many professions.
3. Other Programs:
   - Programs such as Criminology, Tourism and Recreation, and Veterinary Medicine also enjoy stable interest, with applications per spot ranging from 5 to 8 across various years.
   - National Security has shown declining interest in recent years, dropping from 8 applications per spot in 2018/2019 to 3-4 in recent years.
4. Trends Over Time:
   - The growing popularity of programs such as the Medical Program and Psychology may reflect changing labor market needs, and the prestige associated with these professions.
   - The decreasing interest in programs such as National Security could result from labor market saturation in this field or changing preferences among candidates.

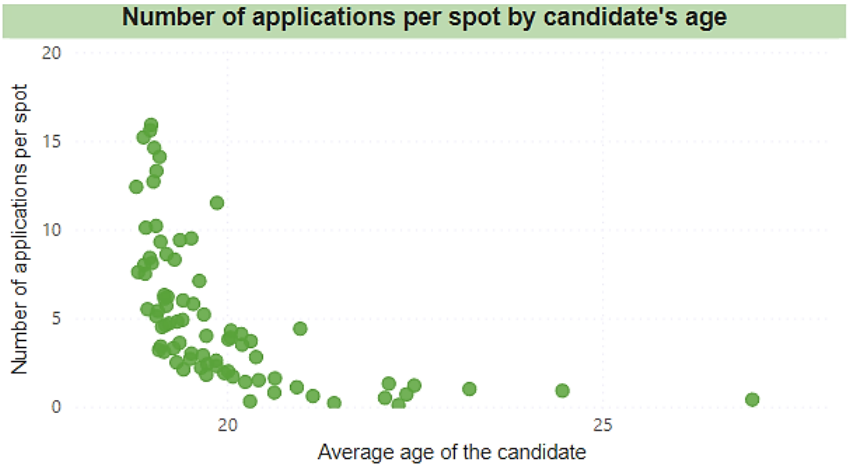
The observed relationships allow for the formulation of several significant conclusions:

- The ranking of study programs shows that some, such as the Medical Program and Psychology, have consistently attracted the highest number of candidates per spot over the years.
- Language programs, such as English Philology, remain consistently popular, highlighting the importance of language skills in today's job market.
- The declining popularity of certain programs, such as National Security, may signal the need for universities to adapt their educational offerings to the evolving needs of the labor market and candidate interests.

After analyzing the popularity of faculties and study programs, the next step was to examine the impact of candidates' demographic characteristics on their educational choices.

In this context, particular attention was given to the relationship between the average age of candidates and the number of applications per spot. This analysis may provide additional insights into the diversity of age groups among candidates and their preferences regarding the selection of study programs.

Based on the accompanying chart, a clear trend can be observed. The number of applications per spot decreases as the average age of candidates increases. This indicates that younger candidates are more likely to apply for a single spot than older ones (Figure 7).



Note. The figure shows the relationship between candidates' average age and the number of applications per spot. It highlights a clear trend where younger candidates submit more applications per spot compared to older candidates, reflecting differences in application strategies across age groups.

Figure 7. Impact of candidates' age on the number of applications per spot.

Source: Own study.

Possible conclusions from this observation are as follows:

1. Greater competition among younger candidates: Younger candidates, fresh out of high school, may be more active in applying to various programs to increase their chances of admission. This strategy could result from greater societal pressure to pursue higher education immediately.
2. Fewer options for older candidates: Older candidates may face limited application options due to specific program requirements, such as mandatory exams or a restricted selection of programs aligned with their interests and needs.
3. Experience and the number of applications: Older candidates, with more professional experience, may be more aware of their educational goals. They often apply to fewer programs but choose those that better match their qualifications and career plans.
4. Specific needs of older candidates: Older candidates may prefer programs offering more flexible forms of education, such as part-time studies, which decreases their interest in competitive programs with high application rates.
5. Limited promotion of educational offerings for older age groups: It is possible that educational offerings or their promotion are more targeted toward younger candidates, affecting the interest levels of older groups. Universities could consider adopting a more

diversified approach in communicating with potential candidates across different age groups.

6. Social pressure and personal aspirations: Younger candidates may be more inclined to apply intensively due to career aspirations and societal pressure to achieve academic success. In contrast, older candidates often focus on programs that meet their current professional needs.

In the higher education recruitment process, candidates employ various application strategies, reflecting their approach to selecting study programs and assessing their chances of admission. This study specifically analyzed the number of applications submitted by candidates within a single academic year. Examining these strategies provides a deeper understanding of candidates' behaviors and the factors influencing their application decisions, aligning with the main objective of this study: identifying the key elements impacting recruitment processes.

The data presented in Table 2 and Table 3 enable an assessment of how often candidates apply to more than one program and what the dominant behavioral patterns in this regard are.

Conclusions drawn from the analysis presented in Tables 2 and 3 include:

1. Increase in the number of applications and changing application strategies. Over the years, the number of applications has systematically grown, which may result from both an increase in the number of candidates and a higher number of applications submitted by individual candidates. Table 2 shows a rise in the percentage of candidates submitting more than one application (from 53.25% in 2018/2019 to 57.37% in 2023/2024). This may indicate an increasingly informed and strategic approach by candidates to the application process.

Table 2.
Number of applications and percentage of candidates applying to more than one program

Academic year	Total applications	Number of candidates (>1 application)	% of candidates (>1 application)	Number of unique applications	Number of unique candidates (>1 application)	% of unique candidates (>1 application)
2018/2019	12,145	6,467	53.25%	8,520	2,842	33.36%
2019/2020	11,457	5,812	50.73%	8,160	2,515	30.82%
2020/2021	11,570	6,368	55.04%	7,867	2,665	33.88%
2021/2022	14,269	7,697	53.94%	9,757	3,185	32.64%
2022/2023	14,067	7,835	55.70%	9,395	3,163	33.67%
2023/2024	13,840	7,940	57.37%	9,087	3,187	35.07%
Total	77,348	42,119	54.45%	48,231	16,721	34.67%

Note. The table summarizes the total number of applications and the percentage of candidates who submitted more than one application for each academic year. It highlights the growing trend of candidates adopting multiple-application strategies over time, indicating an increase in competitiveness and strategic planning in the university admission process.

Source: Own study.

Table 3.
Distribution of the number of applications submitted by a single candidate within one academic year

Number of applications in 1 year	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023	2023/2024	Total
1	5,678	5,645	5,202	6,572	6,232	5,900	33,039
2	1,945	1,762	1,724	2,095	1,998	1,972	11,183
3	674	548	661	730	776	775	4,098
4	159	148	190	242	253	247	1,249
5	42	42	52	79	81	103	395
6	12	10	18	26	32	33	131
7	7	7	7	9	11	15	56
8	2	1	6	9	2	13	33
9	1	-	1	4	-	-	6
10	-	1	-	-	-	-	1
11	-	-	-	-	1	-	1
16	-	-	-	-	-	1	1
Total	8,520	8,160	7,867	9,757	9,395	9,087	48,231

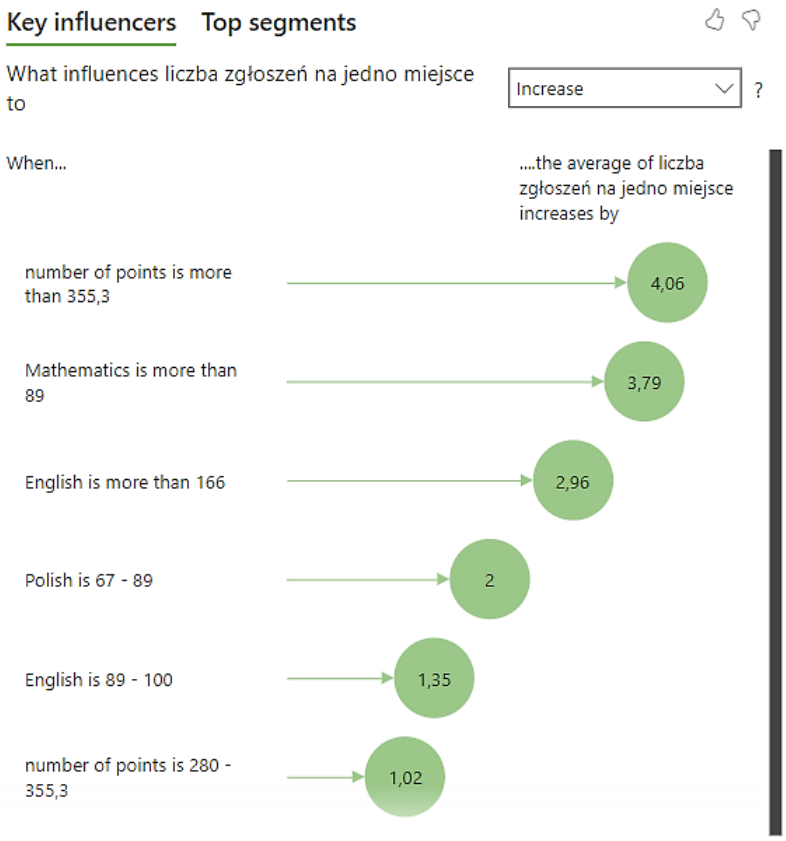
Note. The table presents the distribution of the number of applications submitted by individual candidates within a single academic year. It illustrates the prevalence of single and multiple applications, showing that most candidates submit one or two applications, while a smaller group employs more extensive application strategies.

Source: Own study.

2. Distribution of applications within a single academic year. Data in Table 3 reveals that most candidates submit one or two applications, which may reflect their specific preferences or a limited number of suitable study programs. At the same time, there is a group of candidates submitting five or more applications, suggesting riskier strategies aimed at maximizing admission chances.
3. Growing competition. The increase in the number of applications, coupled with a higher percentage of candidates submitting multiple applications, points to growing competition in the recruitment process. Candidates are increasingly trying to improve their chances by applying to several programs simultaneously.
4. Significance of unique applications. The stable growth in the number of unique candidates (Table 2) reflects rising interest in higher education, potentially driven by greater accessibility to education or changes in the labor market. It is noteworthy that the number of unique candidates submitting applications to more than one program is also systematically increasing, emphasizing the diversity of application strategies.

To understand the key factors influencing the average number of applications per spot, an analytical tool available in Power BI, named "Key Influencers," was utilized. This tool enables the identification of variables that significantly determine the dependent value under study – in this case, the number of applications per spot. This analysis facilitates a detailed examination of the relationships between candidates' results (e.g., scores in specific high school subjects) and their application decisions.

The results presented in Figure 8, based on data processed in the Power BI environment, provide practical insights into factors influencing recruitment processes. This enabled the identification of threshold exam scores that have a critical impact on increasing the average number of applications per spot.



Note. The figure presents the results of the key influencer analysis conducted in Power BI, identifying variables with the most significant impact on the number of applications per spot. It highlights the importance of high exam scores in Mathematics and English, as well as overall total scores, in shaping application behaviors.

Figure 8. Analysis of key influencers affecting the number of applications per spot.

Source: Own study.

Similar analytical approaches are used in the scientific literature. For instance, research conducted by Black, Cortes, and Lincove (2020) analyzed factors influencing applicants' decisions in the United States. Advanced statistical methods were employed to identify key variables determining candidates' educational choices. Similarly, Estevan, Gall, and Morin (2019) highlighted the specific characteristics of candidates within the context of affirmative action programs, representing another example of the application of key influencer analysis.

The bubble chart in Figure 8 presents the key factors influencing the average number of applications per spot, which aligns with one of the primary goals of this study. The analytical tool in Power BI facilitated the identification of these variables and their hierarchical impact, making a significant contribution to understanding recruitment mechanisms.

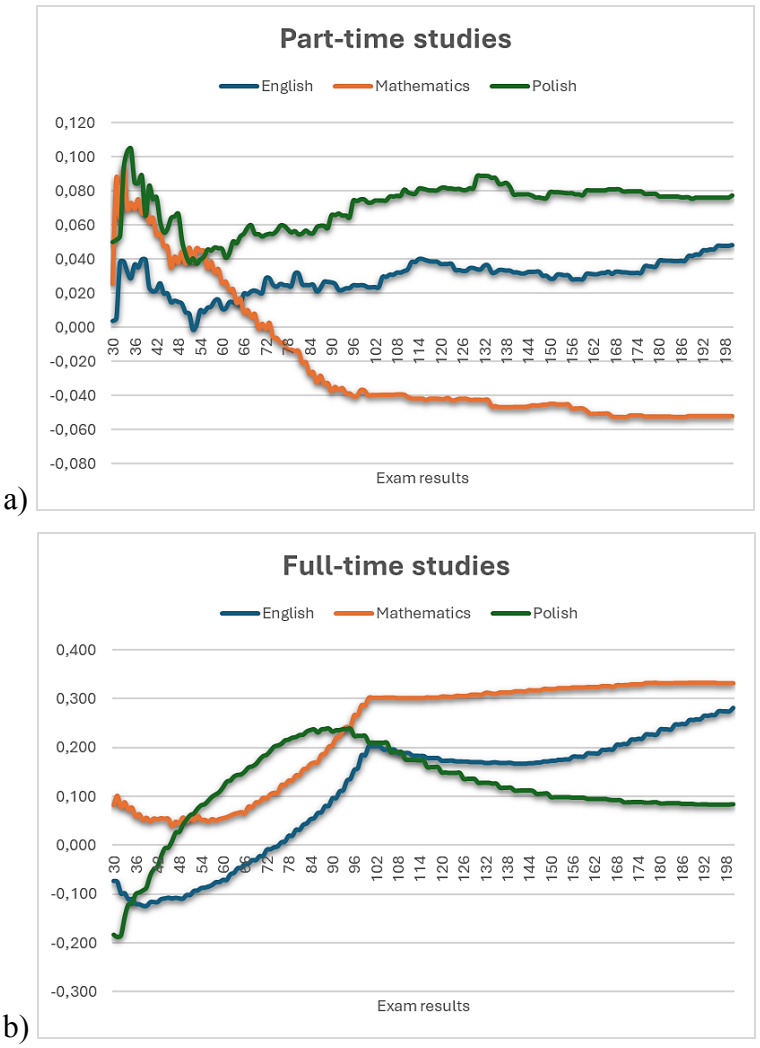
1. Key factors influencing the number of applications:
   - The most influential factor is the total score exceeding 355.3 points, which increases the average number of applications by 4.06. This finding confirms that candidates with high scores are more likely to apply for popular programs.
   - A mathematics score above 89 (impact: 3.79) and an English score above 166 (impact: 2.96) highlight the critical role of these subjects in candidates' application strategies.
   - A Polish language score between 67–89 (impact: 2.00) also contributes to an increase in the number of applications, albeit to a lesser extent.
2. Segmentation of candidates:
   - The chart clearly segments candidates into groups based on their exam results. The group of candidates scoring above 355 points is the most active in terms of applications, while candidates scoring between 280-355 points demonstrate a lower average number of applications (1.02).
3. Significance of academic performance in the context of the research goal:
   - The results indicate that the key factors influencing the number of applications per spot are high scores in mathematics and English, as well as the overall score. This analysis directly supports the main objective of the research, which is to identify the determinants of application numbers. These findings provide valuable insights into which candidate characteristics are most significant in the recruitment process.

Based on the conducted analyses, the following conclusions can be drawn:

- Universities can use this data to optimize their recruitment processes by focusing on candidate groups with the highest scores in mathematics and English.
- Candidates may realize that improving their performance in key subjects can increase their chances of success when applying to highly competitive programs.

It is worth noting that the data in Figure 7 demonstrates a significant correlation between age and the number of applications per spot. However, multivariate analysis (Figure 8) indicates that in the context of other variables, such as the total score or performance in mathematics and English, age is not one of the key factors influencing the number of applications. This suggests that, although age has some relevance, its impact is relatively smaller compared to other elements.

Correlation analysis enables the identification of relationships between variables and explains how performance in key high school subjects can influence the popularity of specific forms of study. The charts presented in Figure 9a and Figure 9b show the correlations of high school exam scores in English, mathematics, and Polish concerning the study formats – full-time and part-time. Separating these two formats provides a better understanding of the differences in preferences among candidates applying for different study modes, as well as the key factors influencing application decisions.



Note. The figure contains two charts illustrating the correlations between the number of applications per spot and high school exam results in English, Mathematics, and Polish. Part (a) shows correlations for part-time studies, while part (b) focuses on full-time studies. The charts highlight the stronger influence of Mathematics and English results on full-time applications, compared to more varied patterns in part-time applications.

Figure 9. Correlations between the number of applications per spot and high school exam results: a) part-time, b) full-time.

Source: Own study.

A detailed analysis of the charts is presented below, considering key observations and conclusions.

1. Part-time studies (Figure 9a):
   - English: The correlation for English scores is stable and positive for higher score ranges, meaning that candidates with better results are more likely to choose part-time studies. For lower score ranges, the correlation is negative, suggesting less interest in this format among candidates with lower scores.
   - Mathematics: Mathematics scores show a clear negative correlation for low score ranges, which may indicate that part-time studies are less popular among candidates with lower results in this subject. However, for higher scores, the correlation gradually stabilizes around zero.

- Polish: The correlation for Polish scores is positive and most stable, suggesting that this subject has a moderate influence on the choice of part-time studies.

2. Full-time studies (Figure 9b):
   - English: The correlation is negative for low scores but gradually increases and reaches a stable positive level for higher scores. This indicates greater interest in full-time studies among candidates with better results in English.
   - Mathematics: The correlation for mathematics scores is clearly positive and the highest among the analyzed subjects. This suggests that mathematics plays a key role in the choice of full-time studies.
   - Polish: The correlation for Polish scores remains stable and positive but is lower compared to mathematics and English, indicating that it plays a lesser role in application decisions for full-time studies.

Based on the presented charts, key conclusions were formulated, considering significant relationships and observations.

1. Differences between study formats:
   - For full-time studies, mathematics has the greatest influence on candidates' decisions, whereas this correlation is less significant for part-time studies.
   - English scores are important for both study formats but differ in their impact for low and high score ranges.
   - Polish has the least influence on the choice of study format, but its correlation remains stable in both cases.
2. Candidate preferences:
   - Candidates with higher scores in key subjects prefer full-time studies, which may be related to the higher academic demands and prestige of this study format.
   - Candidates with lower scores in mathematics are more inclined to choose part-time studies.
3. Application strategies:
   - Differences in correlations suggest that candidates employ different application strategies, depending on the study format and their high school exam results.

The analyses conducted in this section enabled the verification of the research hypotheses, which are discussed in detail in the next part of the article.

5. Verification of research hypotheses and conclusions

As part of this section of the article, the research hypotheses were verified based on the conducted analyses. Subsequently, conclusions were drawn from the obtained results, addressing both theoretical implications and practical aspects of managing recruitment processes.

The conducted research successfully achieved the main objective of the article, which was to identify key factors influencing the number of applications per spot in undergraduate and integrated master's programs. Analyses considering high school exam results, candidate age, and application strategies allowed for a detailed understanding of the mechanisms determining recruitment processes and their impact on different groups of candidates. The achieved results also enabled the verification of research hypotheses, which is presented in detail in the subsequent sections of the article.

5.1. Preliminary verification of research hypotheses

Hypothesis H1. *Exam results in mathematics and English are significant factors influencing the number of applications per spot*

Evidence from previous analyses:

1. Key influencers (Figure 8):
    - The number of points in mathematics above 89 and in English above 166 was identified as a key factor, confirming that high scores in these subjects have a substantial impact on the number of applications per spot.
    - The influence of mathematics (3.79) and English (2.96) is significant, highlighting their dominant role in the application process.
2. Correlations between results and study formats (Figure 9a and 9b):
    - In both study formats (full-time and part-time), mathematics and English scores show clear positive correlations with the number of applications, particularly in higher score ranges.
    - Mathematics demonstrates a stronger influence on the choice of full-time studies, further supporting its importance.

Preliminary conclusion: Hypothesis H1 finds strong support in the analyzed data, allowing for its preliminary confirmation. However, it is advisable to complement this verification with statistical tests to confirm the significance of the observed relationships.

Hypothesis H2. *Study formats differ in terms of factors determining candidates' choices*

Evidence from previous analyses:

1. Correlations between results and study formats (Figure 9a and 9b):
   - Full-time studies (Figure 9b):
     - ✓ Mathematics plays a key role, with a clearly positive correlation, indicating the importance of high scores in this subject.
     - ✓ English also shows a positive correlation, but it is smaller compared to mathematics.
   - Part-time studies (Figure 9a):
     - ✓ Mathematics has a lower correlation, suggesting that scores in this subject are less significant for this study format.
     - ✓ The correlation with Polish is more stable, which may indicate that this subject plays a greater role in the choice of part-time studies.
2. Distribution of results across individual subjects:
   - Full-time studies attract candidates with higher scores in mathematics and English, while part-time studies appeal to a more diverse group in terms of results.

Preliminary conclusion: Hypothesis H2 is supported by the observed differences between study formats. To fully verify it, statistical analyses should be conducted to compare differences between groups.

Conclusions for further actions:

1. Hypotheses H1 and H2 can be considered preliminarily confirmed based on the available data.
2. Further statistical analyses may provide evidence of the statistical significance of the observed differences and relationships.

5.2. Final verification of research hypotheses

Hypothesis H1

The linear regression analysis confirmed that mathematics and English results are statistically significant predictors of the number of applications per spot. The coefficient of determination $R^2 = 0.155$ indicates that 15.5% of the variability in the number of applications can be explained by these results.

The regression coefficients show that:

- The mathematics score ($\beta = 0.0431, p < 0.001$) has a greater impact on the number of applications than the English score ($\beta = 0.0178, p < 0.001$).
- Both factors are positively correlated with the number of applications per spot.

These results confirm Hypothesis H1, indicating that both mathematics and English play a key role in increasing the number of applications per spot.

Hypothesis H2

The results of the t-test comparing the average number of applications per spot between younger (<20 years old) and older (≥20 years old) candidates indicate a statistically significant difference:

- Statistic ($t = 41.25, p < 0.001$).
- Younger candidates have a higher average number of applications per spot compared to older candidates.

These findings align with Hypothesis H2, suggesting that younger candidates adopt more active application strategies, contributing to a higher average number of applications per spot.

Based on the conducted statistical analysis, hypotheses H1 and H2 were positively verified, confirming the significant impact of high school exam results in mathematics and English on the number of applications per spot, as well as the more active application strategies employed by younger candidates.

5.3. Discussion

1. Significance of the results in the context of research. The results emphasize the critical role of high school exam performance, particularly in Mathematics and English, in shaping application behaviors. This finding highlights the importance of STEM and language education in fostering broader access to higher education.
2. Novelty of the findings compared to previous knowledge. Unlike prior studies focusing solely on overall application numbers, this research identifies specific threshold scores in Mathematics and English that significantly increase the likelihood of multiple applications per spot. This detailed perspective provides actionable insights for university recruitment policies.
3. Similarities and differences in the results. The study confirms existing findings regarding the prevalence of younger candidates submitting multiple applications, while also demonstrating a lesser-explored pattern of older candidates opting for fewer, more targeted applications. This contrast underscores the diverse strategies employed by different age groups.

5.4. Conclusions

1. The impact of high school exam results on the number of applications (H1). Statistical analysis confirmed that results in mathematics and English are key factors influencing the number of applications per spot. Mathematics scores have a greater impact than English scores, highlighting the importance of competencies in STEM subjects for the recruitment process. The findings suggest that improving high school exam results in these subjects can increase candidates' chances of success when applying to popular programs.

2. Differences in application strategies by age (H2). Younger candidates (<20 years old) are more likely to submit multiple applications to various programs, increasing the average number of applications per spot. This phenomenon is driven by more active application strategies in this group, potentially motivated by social pressure and the desire to maximize admission chances. Older candidates, though fewer in number, demonstrate a more selective approach to program choice.
3. The role of study formats. The analysis revealed differences in correlations between high school exam results for full-time and part-time studies. Full-time studies attract candidates with higher mathematics scores, which may be due to the higher academic demands of these formats. Part-time studies are more diverse in terms of candidate scores, suggesting greater accessibility.
4. Usefulness of applied methods. The use of linear regression analysis, t-tests, correlation analysis, and multivariate modeling in Power BI enabled a comprehensive assessment of key factors influencing the number of applications per spot. These findings provided valuable insights for both recruitment practices and further research into candidate behaviors.
5. Practical implications. The findings can help universities better understand recruitment mechanisms. In particular:
   - Additional support could be considered for candidates with lower mathematics and English scores to improve their competitiveness.
   - Analyzing younger candidates' application strategies could help tailor educational offerings to their needs.
   - Adjusting promotional and informational policies for older candidates may increase their interest and participation in recruitment processes.
6. Future research perspectives. The results highlight the need for further exploration of demographic and psychological factors that may influence candidates' choices. Additionally, it would be worthwhile to investigate how changing market and societal conditions shape recruitment processes in the coming years.

5.5. Recommendations

The results of this study provide several practical recommendations for universities aiming to optimize their recruitment strategies:

1. Targeted promotion for less popular programs: Faculties and programs with consistently lower numbers of applications per spot could benefit from enhanced promotion. Tailored communication strategies should highlight the unique strengths and career opportunities associated with these programs.
2. Support for candidates with lower exam scores: Given the significant role of Mathematics and English exam results in application strategies, universities might

consider offering preparatory courses or additional support for candidates with lower scores to improve their competitiveness.

3. Adapting to the needs of older candidates: Older candidates often submit fewer applications, potentially due to different needs or barriers in the application process. Introducing more flexible study options, such as part-time or hybrid programs, could attract a broader range of applicants.
4. Leveraging data for informed decision-making: Universities should continue using tools like Power BI to analyze key factors influencing applications. Such analyses can provide insights for adjusting recruitment policies and optimizing application processes.

By implementing these recommendations, universities could not only increase the number of applications but also ensure a more inclusive and efficient recruitment process.

Acknowledgements

I would like to express my sincere gratitude to the administration of the University of Warmia and Mazury in Olsztyn for granting permission to use recruitment data for the purposes of this study. The obtained data were crucial for achieving the results presented in this article.

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