Study on the Relationship Between the Education Process of Students in Economic-Informatics Studies and Their Professional Prospects

Table of Contents

Introduction

The study aimed to investigate the relationship between the educational process of students in economic-informatics studies and their career prospects. The statistical analysis was based on variables describing completed studies, including university type, study mode, city of study, completed major, average grades, scholarship status, software used during studies, and satisfaction with studies rated on a 7-point scale. The following designations were adopted:

1 – very dissatisfied,

2 – dissatisfied,

3 – moderately dissatisfied,

4 – neither dissatisfied nor satisfied,

5 – moderately satisfied,

6 – satisfied,

7 – very satisfied.

Variables describing post-graduate employment were also analyzed, including the time taken to find a job in months, whether the job was found in less than 3 months, and the industry in which the individual found employment. Variables describing each graduate, such as gender and age, were characterized as well. Correspondence analysis was performed, examining the relationship between the industry and major, and percentage tests were conducted. Additionally, models were created to explain satisfaction with studies and the time taken to find employment.

Methods

Descriptive statistics such as mean, median, standard deviation (SD), and the first and third quartiles (IQR) were used to characterize the studied population. For continuous data, the range was also employed to describe the characteristics of the study group. Regarding the variable "satisfaction with studies," which includes responses on a 7-point Likert scale, a ranking system was adopted for comparative purposes, with 1 indicating "Very Dissatisfied" and 7 indicating "Very Satisfied." The distribution of ordinal variables was presented in terms of the frequency of each category and the percentage relative to the total.

In the study, the Mann-Whitney U test, Kruskal-Wallis test (with post hoc Dunn's test and Bonferroni correction for multiple testing), chi-square test, and Fisher's test were used. The Mann-Whitney U test is a non-parametric test used to determine significant differences in the distribution of a variable between two groups. The Kruskal-Wallis test is also a non-parametric test used to compare the distribution of a variable among multiple groups. Chi-square and Fisher's tests were used to explore relationships between categorical variables.

The strength of the relationship between two binary variables was assessed using the Phi coefficient, which takes values from -1 to 1. Values close to 0 indicate a weaker relationship between variables, while values near 1 signify a strong positive relationship, and values near -1 indicate a negative one. To assess the degree of dependency between variables, a scale published by The Political Science Department at Quinnipiac University was used:

- $|\Phi| = 0$ – no relationship,
- $0.0 <|\Phi| < 0.2$ – weak relationship,
- $0.2 \leq |\Phi| < 0.3$ – weak relationship,
- $0.3 \leq |\Phi| < 0.4$ – average relationship,
- $0.4 \leq |\Phi| < 0.7$ – high relationship,
- $|\Phi| \geq 0.7$ – very high relationship.

Phi coefficients were graphically represented using a heatmap. The closer the values are to 1, the warmer the color of a point on the map (closer to red), and the closer to -1, the cooler the color (closer to blue). Values close to zero are represented with colors close to white.

A multidimensional correspondence analysis was conducted in the study, which is a statistical method that allows the visualization of relationships between categories taken by at least three qualitative variables. Interpretation of the charts is based on assessing the relative positions of points, both for entire variables and individual categories. Points representing active categories, meaning those for which questionnaire responses occur in at least 5% of cases, are marked in red, while passive categories, for which the overall occurrence does not reach the 5% level, are marked in blue. The closer the points representing categories are to each other, the more similar their distributions, which may indicate co-occurrence of these factors. Strong dependencies between categories are also

observed in tables and graphs showing the percentage contribution of these factors to the creation of individual dimensions. The higher the values of these percentages within one dimension, the stronger the relationship between these variables.

In the study, ordinal regression models were employed. This is a modeling method for variables presented on an ordinal scale, where variables are ordered according to a specific, pre-defined hierarchy. This model provides the probability of each possible response for the variables. The response with the highest probability is selected. To calculate these probabilities, a series of logistic regressions in the form of[1]:

$$\Pr Pr\,(y > 1) = logit^{-1}(X\beta)\ \Pr Pr\,(y > 2) = logit^{-1}(X\beta - c_2)\ \Pr Pr\,(y > 3) = logit^{-1}(X\beta - c_3)$$

$$\ldots$$

$$\Pr Pr\,(y > K - 1) = logit^{-1}\left(X\beta - c_{K-1}\right)$$

was considered, where

y- the dependent variable (category);

X-the matrix of explanatory variables;

β-the vector of model parameters;

c_i-the cutpoint.

Hence, the probability of determining a value for a specific category can be calculated using the formula:

$$(y > k - 1) - Pr(y > k) = logit^{-1}\left(X\beta - c_{k-1}\right) - logit^{-1}\left(X\beta - c_k\right).$$

In the case of the analysis below, regression was conducted for the variable "satisfaction with studies." Using the stepwise method and based on a one-factor analysis, a logistic regression model was also constructed. This model was used to calculate odds ratios, which indicate how many times the risk/chance of the event described by the dependent variable increases with a one-unit increase in a given explanatory variable.

Additionally, linear models were created, which forecast a quantitative variable through linear relationships between the dependent variable and one or more explanatory variables.

[1] Gelman, A., & Hill, J. (2006). Data Analysis Using Regression and Multilevel/Hierarchical Models (Analytical Methods for Social Research). Cambridge: Cambridge University Press. doi:10.1017/CBO9780511790942 s.119-120

A significance level of p = 0.05 was adopted, but statistically significant results were also indicated for p-levels of 0.01 and 0.001. P-values indicating a statistically significant result were highlighted in bold font. In cases where p < 0.001, the notation p < 0.001 was always used.

All calculations and plots were carried out using the R statistical package, version 4.0.2.

Baseline Characteristics

Table 1 presents the baseline characteristics of the study participants. The study included 200 students, of whom 54% were male and 46% were female. The average age was around 29 years (±3.99, standard deviation), with the youngest person being 22 years old and the oldest 35 years old. The study included universities from four cities, with the largest percentage of individuals (31.5%) coming from city 2. Nearly half of the students (49%) were enrolled in universities. Moreover, 63% of the individuals were pursuing their studies in full-time mode. Students were pursuing both undergraduate (69.5%) and graduate (30.5%) degrees. Among the participants, the most common majors were applied mathematics (42 individuals), data science (33 individuals), and mathematics (32 individuals). Among all the universities, 48.5% ranked in the top 10 in the X ranking. Regarding programming skills, RStudio and Python were the dominant choices, with 55% and 51.5% of individuals using them, respectively. The time it took for participants to find employment was approximately 6 months (±3.73), with 32.5% of individuals finding jobs in less than 3 months. As for the industry in which these individuals found employment, analytics (16%) and banking (15.5%) were the most common sectors. Satisfaction with studies was measured on a scale from 1 to 7, with a rating of 5 being the most common (21%), and a rating of 7 being the least common (6%). The average GPA among the surveyed students was 4.06 (±0.59), with 43 individuals (21.5%) receiving scholarships.

Table 1. General Descriptive Characteristics

Variable	Parameter	Total (N=200)
Gender	Male	54% (N=108)
	Female	46% (N=92)
Age	N	200
	Mean (SD)	28,59 (3,99)
	Median (IQR)	28 (25 - 32)
	Range	22 - 35
City	City 1	22,5% (N=45)
	City 2	31,5% (N=63)
	City 3	24,5% (N=49)
	City 4	21,5% (N=43)
Type of University	University	49% (N=98)
	Polytechnic	30,5% (N=61)
	Other	20,5% (N=41)

Mode of Study	Full-time	63% (N=126)
	Part-time	25% (N=50)
	Evening	12% (N=24)
Level	1	69,5% (N=139)
	2	30,5% (N=61)
Field of Study	Analytics	11,5% (N=23)
	Big Data	12% (N=24)
	Econometrics	12% (N=24)
	Economics	11% (N=22)
	Data Science	16,5% (N=33)
	Mathematics	16% (N=32)
	Applied Mathematics	21% (N=42)
University in the Top 10 in Ranking X	Yes	48,5% (N=97)
	No	51,5% (N=103)
RStudio	Yes	55% (N=110)
	No	45% (N=90)
Statistica	Yes	35,5% (N=71)
	No	64,5% (N=129)
Python	Yes	51,5% (N=103)
	No	48,5% (N=97)
Matlab	Yes	36,5% (N=73)
	No	63,5% (N=127)
Econometric Views	Yes	22% (N=44)
	No	78% (N=156)
SPSS	Yes	33% (N=66)
	No	67% (N=134)
Time to Find Employment (months)	N	200
	Mean (SD)	6,11 (3,73)
	Median (IQR)	5 (3 - 10)
	Range	0 - 12
Finding a Job in Less Than 3 Months	Yes	32,5% (N=65)

	No	67,5% (N=135)
Industry	Market Research and Public Opinion	11,5% (N=23)
	Analytics	16% (N=32)
	Academic Career	11% (N=22)
	Accounting	12% (N=24)
	Banking	15,5% (N=31)
	IT - Programming	8,5% (N=17)
	IT - Data Engineering	14% (N=28)
	Other	11,5% (N=23)
Satisfaction with Studies	1	10,5% (N=21)
	2	15% (N=30)
	3	11,5% (N=23)
	4	19,5% (N=39)
	5	21% (N=42)
	6	16,5% (N=33)
	7	6% (N=12)
Average GPA	N	200
	Mean (SD)	4,06 (0,59)
	Median (IQR)	4,1 (3,6 - 4,53)
	Range	3 - 5
Scholarship	Receiving Scholarship	21,5% (N=43)
	No Scholarship	78,5% (N=157)

Characteristics by Gender

When dividing the data by gender, significant differences were found only in the industry (Fisher p-value = 0.0023). Men more frequently than women found jobs in the fields of IT - Data Engineering, IT - Programming, or pursued academic careers. Women, on the other hand, predominated in the fields of analytics, market research and public opinion, banking, and other sectors.

Table 2. Descriptive Characteristics by Gender

Variable	Parameter	Male (N=108)	Female (N=92)	test	p-value
Wiek	N	108	92	U Mann-Whitney	0,3873
	Mean (SD)	28,37 (4,08)	28,84 (3,89)		
	Median (IQR)	28 (25 - 31,25)	29 (26 - 32)		
	Range	22 - 35	22 - 35		
City	City 1	28,7% (N=31)	15,2% (N=14)	Chi-square	0,0723
	City 2	32,4% (N=35)	30,4% (N=28)		
	City 3	19,4% (N=21)	30,4% (N=28)		
	City 4	19,4% (N=21)	23,9% (N=22)		
Type of University	University	48,1% (N=52)	50% (N=46)	Chi-square	0,9461
	Polytechnic	31,5% (N=34)	29,3% (N=27)		
	Other	20,4% (N=22)	20,7% (N=19)		
Mode of Study	Full-time	63,9% (N=69)	62% (N=57)	Chi-square	0,9121
	Part-time	25% (N=27)	25% (N=23)		
	Evening	11,1% (N=12)	13% (N=12)		
Level	1	68,5% (N=74)	70,7% (N=65)	Chi-square	0,863
	2	31,5% (N=34)	29,3% (N=27)		
Field of Study	Analytics	10,2% (N=11)	13% (N=12)	Chi-square	0,3182

Variable	Parameter	Male (N=108)	Female (N=92)	test	p-value
	Big Data	13% (N=14)	10,9% (N=10)		
	Econometrics	14,8% (N=16)	8,7% (N=8)		
	Economics	6,5% (N=7)	16,3% (N=15)		
	Data Science	17,6% (N=19)	15,2% (N=14)		
	Mathematics	17,6% (N=19)	14,1% (N=13)		
	Applied Mathematics	20,4% (N=22)	21,7% (N=20)		
University in the Top 10 in Ranking X	Yes	45,4% (N=49)	52,2% (N=48)	Chi-square	0,4136
	No	54,6% (N=59)	47,8% (N=44)		
RStudio	Yes	57,4% (N=62)	52,2% (N=48)	Chi-square	0,5493
	No	42,6% (N=46)	47,8% (N=44)		
Statistica	Yes	36,1% (N=39)	34,8% (N=32)	Chi-square	0,9622
	No	63,9% (N=69)	65,2% (N=60)		
Python	Yes	52,8% (N=57)	50% (N=46)	Chi-square	0,8027
	No	47,2% (N=51)	50% (N=46)		
Matlab	Yes	36,1% (N=39)	37% (N=34)	Chi-square	1

Variable	Parameter	Male (N=108)	Female (N=92)	test	p-value
	No	63,9% (N=69)	63% (N=58)		
Econometric Views	Yes	18,5% (N=20)	26,1% (N=24)	Chi-square	0,2642
	No	81,5% (N=88)	73,9% (N=68)		
SPSS	Yes	30,6% (N=33)	35,9% (N=33)	Chi-square	0,5185
	No	69,4% (N=75)	64,1% (N=59)		
Time to Find Employment (months)	N	108	92	U Mann-Whitney	0,6784
	Mean (SD)	5,98 (3,76)	6,25 (3,71)		
	Median (IQR)	5 (3 - 10)	6 (3 - 9,25)		
	Range	0 - 12	0 - 12		
Finding a Job in Less Than 3 Months	Yes	31,5% (N=34)	33,7% (N=31)	Chi-square	0,8558
	No	68,5% (N=74)	66,3% (N=61)		
Industry	Market Research and Public Opinion	11,1% (N=12)	12% (N=11)	Fisher	**0,0023**
	Analytics	13% (N=14)	19,6% (N=18)		
	Academic Career	13% (N=14)	8,7% (N=8)		
	Accounting	9,3% (N=10)	15,2% (N=14)		
	Banking	13% (N=14)	18,5% (N=17)		
	IT - Programming	11,1% (N=12)	5,4% (N=5)		

Variable	Parameter	Male (N=108)	Female (N=92)	test	p-value
	IT - Data Engineering	22,2% (N=24)	4,3% (N=4)		
	Other	7,4% (N=8)	16,3% (N=15)		
Satisfaction with Studies	1	9,3% (N=10)	12% (N=11)	Chi-square	0,4894
	2	16,7% (N=18)	13% (N=12)		
	3	10,2% (N=11)	13% (N=12)		
	4	22,2% (N=24)	16,3% (N=15)		
	5	16,7% (N=18)	26,1% (N=24)		
	6	19,4% (N=21)	13% (N=12)		
	7	5,6% (N=6)	6,5% (N=6)		
Average GPA	N	108	92	U Mann-Whitney	0,8405
	Mean(SD)	4,05 (0,61)	4,07 (0,57)		
	Median (IQR)	4,15 (3,58 - 4,53)	4,1 (3,6 - 4,53)		
	Range	3 - 5	3 - 5		
Scholarship	Receiving Scholarship	21,3% (N=23)	21,7% (N=20)	Chi-square	1
	No Scholarship	78,7% (N=85)	78,3% (N=72)		

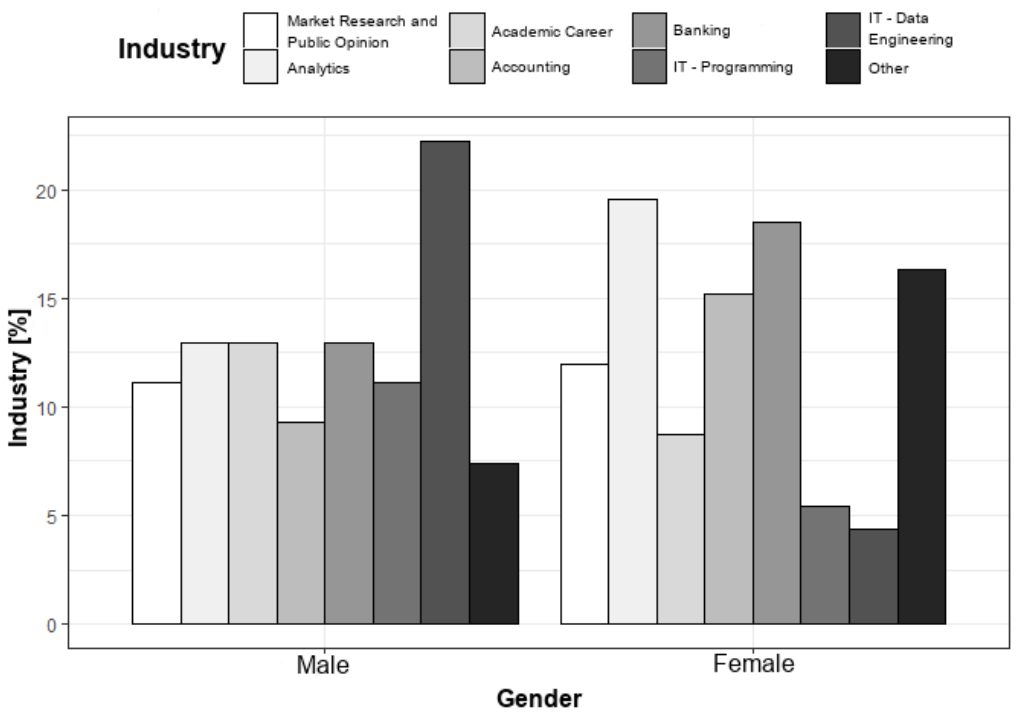

Figure 1. Relationship between Finding a Job in a Specific Industry by Gender (%)

Characteristics by City

When analyzing data for students participating in the study based on the city where their university was located, statistically significant differences were detected for the following variables:

- Proficiency in using the Statistica software (chi-square p-value = 0.0388).
- Time to find a job (months) (Kruskal-Wallis p-value <0.001).
- Finding a job in less than 3 months (Fisher p-value <0.001).

The ability to use the Statistica software was twice as high in City 2 compared to others. The average time to find a job, reported in months, was significantly lower in City 2. It was three times longer for City 3 and City 4. The highest percentage of individuals who found a job in less than 3 months was in City 2, while City 3 had the lowest percentage (0%).

Table 3. Descriptive Characteristics by City

Variable	Parameter	City 1 (N=45)	City 2 (N=63)	City 3 (N=49)	City 4 (N=43)	test	p-value
Gender	Male	68,9% (N=31)	55,6% (N=35)	42,9% (N=21)	48,8% (N=21)	Chi-square	0,0723
	Female	31,1% (N=14)	44,4% (N=28)	57,1% (N=28)	51,2% (N=22)		
Age	N	45	63	49	43	Kruskal-Wallis	0,852
	Mean (SD)	28,47 (4,33)	28,83 (4,13)	28,2 (3,82)	28,79 (3,71)		
	Median (IQR)	27 (25 - 33)	29 (25,5 - 32)	27 (25 - 32)	29 (26 - 31,5)		
	Range	22 - 35	22 - 35	22 - 35	22 - 35		
Mode of Study	Full-time	60% (N=27)	73% (N=46)	63,3% (N=31)	51,2% (N=22)	Fisher	0,1113
	Part-time	20% (N=9)	17,5% (N=11)	30,6% (N=15)	34,9% (N=15)		
	Evening	20% (N=9)	9,5% (N=6)	6,1% (N=3)	14% (N=6)		
Type of University	University	48,9% (N=22)	39,7% (N=25)	59,2% (N=29)	51,2% (N=22)	Chi-square	0,2848
	Polytechnic	35,6% (N=16)	30,2% (N=19)	24,5% (N=12)	32,6% (N=14)		
	Other	15,6% (N=7)	30,2% (N=19)	16,3% (N=8)	16,3% (N=7)		
Level	1	68,9% (N=31)	71,4% (N=45)	67,3% (N=33)	69,8% (N=30)	Chi-square	0,9731
	2	31,1% (N=14)	28,6% (N=18)	32,7% (N=16)	30,2% (N=13)		
Field of Study	Analytics	8,9% (N=4)	15,9% (N=10)	6,1% (N=3)	14% (N=6)	Chi-square	0,6397
	Big Data	13,3% (N=6)	7,9% (N=5)	18,4% (N=9)	9,3% (N=4)		

Variable	Parameter	City 1 (N=45)	City 2 (N=63)	City 3 (N=49)	City 4 (N=43)	test	p-value
	Econometrics	15,6% (N=7)	12,7% (N=8)	14,3% (N=7)	4,7% (N=2)		
	Economics	11,1% (N=5)	7,9% (N=5)	12,2% (N=6)	14% (N=6)		
	Data Science	17,8% (N=8)	22,2% (N=14)	10,2% (N=5)	14% (N=6)		
	Mathematics	8,9% (N=4)	14,3% (N=9)	18,4% (N=9)	23,3% (N=10)		
	Applied Mathematics	24,4% (N=11)	19% (N=12)	20,4% (N=10)	20,9% (N=9)		
University in the Top 10 in Ranking X	Yes	46,7% (N=21)	47,6% (N=30)	51% (N=25)	48,8% (N=21)	Chi-square	0,9765
	No	53,3% (N=24)	52,4% (N=33)	49% (N=24)	51,2% (N=22)		
RStudio	Yes	53,3% (N=24)	52,4% (N=33)	49% (N=24)	67,4% (N=29)	Chi-square	0,304
	No	46,7% (N=21)	47,6% (N=30)	51% (N=25)	32,6% (N=14)		
Statistica	Yes	33,3% (N=15)	49,2% (N=31)	24,5% (N=12)	30,2% (N=13)	Chi-square	**0,0388**
	No	66,7% (N=30)	50,8% (N=32)	75,5% (N=37)	69,8% (N=30)		
Python	Yes	53,3% (N=24)	49,2% (N=31)	49% (N=24)	55,8% (N=24)	Chi-square	0,8876
	No	46,7% (N=21)	50,8% (N=32)	51% (N=25)	44,2% (N=19)		
Matlab	Yes	37,8% (N=17)	31,7% (N=20)	36,7% (N=18)	41,9% (N=18)	Chi-square	0,7577

Variable	Parameter	City 1 (N=45)	City 2 (N=63)	City 3 (N=49)	City 4 (N=43)	test	p-value
	No	62,2% (N=28)	68,3% (N=43)	63,3% (N=31)	58,1% (N=25)		
Econometric Views	Yes	24,4% (N=11)	23,8% (N=15)	24,5% (N=12)	14% (N=6)	Chi-square	0,5567
	No	75,6% (N=34)	76,2% (N=48)	75,5% (N=37)	86% (N=37)		
SPSS	Yes	28,9% (N=13)	23,8% (N=15)	34,7% (N=17)	48,8% (N=21)	Chi-square	0,0528
	No	71,1% (N=32)	76,2% (N=48)	65,3% (N=32)	51,2% (N=22)		
Time to Find Employment (months)	N	45	63	49	43	Kruskal-Wallis	**<0,001**
	Mean (SD)	5,49 (3,72)	2,51 (1,33)	8,88 (2,44)	8,86 (2,32)		
	Median (IQR)	5 (2 - 10)	3 (1,5 - 4)	9 (7 - 11)	9 (7 - 11)		
	Range	0 - 12	0 - 5	5 - 12	3 - 12		
Finding a Job in Less Than 3 Months	Yes	40% (N=18)	73% (N=46)	0% (N=0)	2,3% (N=1)	Fisher	**<0,001**
	No	60% (N=27)	27% (N=17)	100% (N=49)	97,7% (N=42)		
Industry	Market Research and Public Opinion	8,9% (N=4)	14,3% (N=9)	10,2% (N=5)	11,6% (N=5)	Chi-square	0,6306
	Analytics	13,3% (N=6)	25,4% (N=16)	8,2% (N=4)	14% (N=6)		
	Academic Career	13,3% (N=6)	4,8% (N=3)	16,3% (N=8)	11,6% (N=5)		
	Accounting	11,1% (N=5)	14,3% (N=9)	10,2% (N=5)	11,6% (N=5)		
	Banking	17,8% (N=8)	12,7% (N=8)	16,3% (N=8)	16,3% (N=7)		

Variable	Parameter	City 1 (N=45)	City 2 (N=63)	City 3 (N=49)	City 4 (N=43)	test	p-value
	IT - Programming	11,1% (N=5)	9,5% (N=6)	6,1% (N=3)	7% (N=3)		
	IT - Data Engineering	15,6% (N=7)	14,3% (N=9)	12,2% (N=6)	14% (N=6)		
	Other	8,9% (N=4)	4,8% (N=3)	20,4% (N=10)	14% (N=6)		
Satisfaction with Studies	1	4,4% (N=2)	7,9% (N=5)	18,4% (N=9)	11,6% (N=5)	Chi-square	0,4789
	2	15,6% (N=7)	15,9% (N=10)	10,2% (N=5)	18,6% (N=8)		
	3	15,6% (N=7)	7,9% (N=5)	12,2% (N=6)	11,6% (N=5)		
	4	24,4% (N=11)	15,9% (N=10)	18,4% (N=9)	20,9% (N=9)		
	5	13,3% (N=6)	27% (N=17)	20,4% (N=10)	20,9% (N=9)		
	6	24,4% (N=11)	14,3% (N=9)	14,3% (N=7)	14% (N=6)		
	7	2,2% (N=1)	11,1% (N=7)	6,1% (N=3)	2,3% (N=1)		
Average GPA	N	45	63	49	43	Kruskal-Wallis	0,0912
	Mean (SD)	3,94 (0,69)	4 (0,54)	4,08 (0,58)	4,24 (0,55)		
	Median (IQR)	3,8 (3,3 - 4,7)	4 (3,65 - 4,4)	4,2 (3,6 - 4,5)	4,2 (3,95 - 4,7)		
	Range	3 - 5	3 - 5	3 - 5	3,1 - 5		
Scholarship	Receiving Scholarship	28,9% (N=13)	14,3% (N=9)	16,3% (N=8)	30,2% (N=13)	Chi-square	0,106
	No Scholarship	71,1% (N=32)	85,7% (N=54)	83,7% (N=41)	69,8% (N=30)		

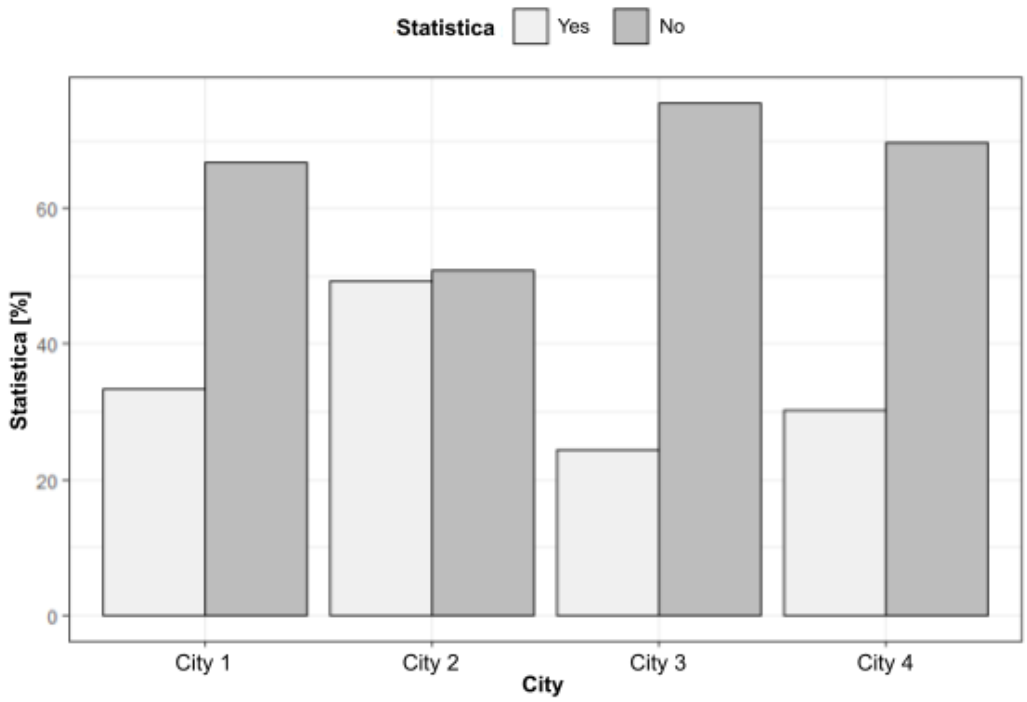

Figure 2. Relationship between Proficiency in using Statistica Software by City (%)

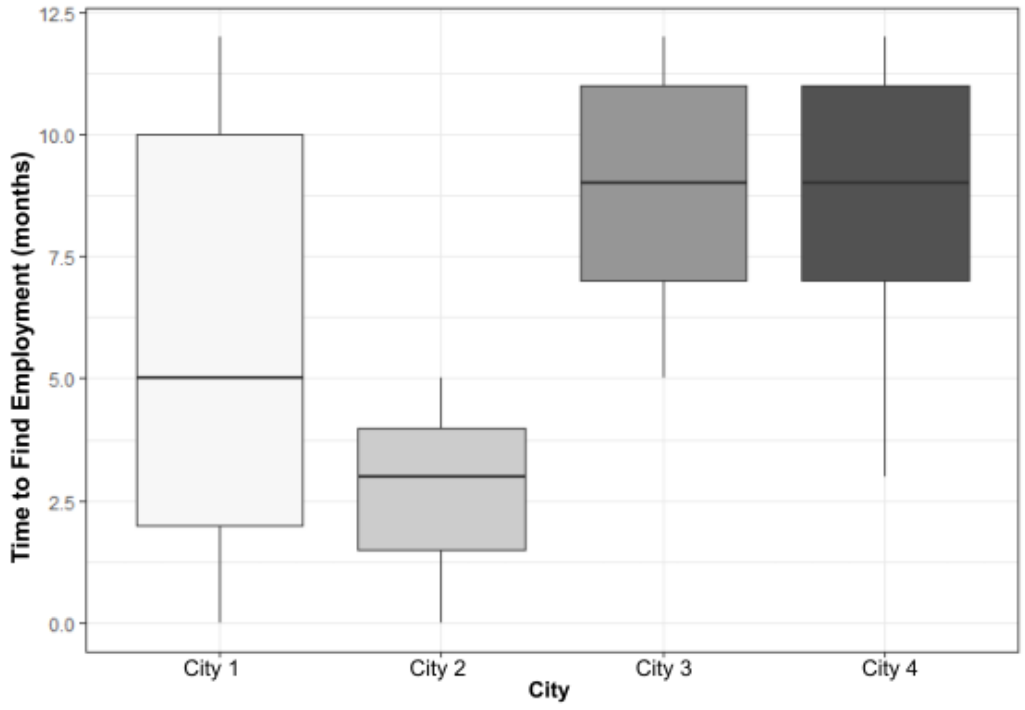

Figure 3. Relationship between Time to Find a Job in Months by City (%)

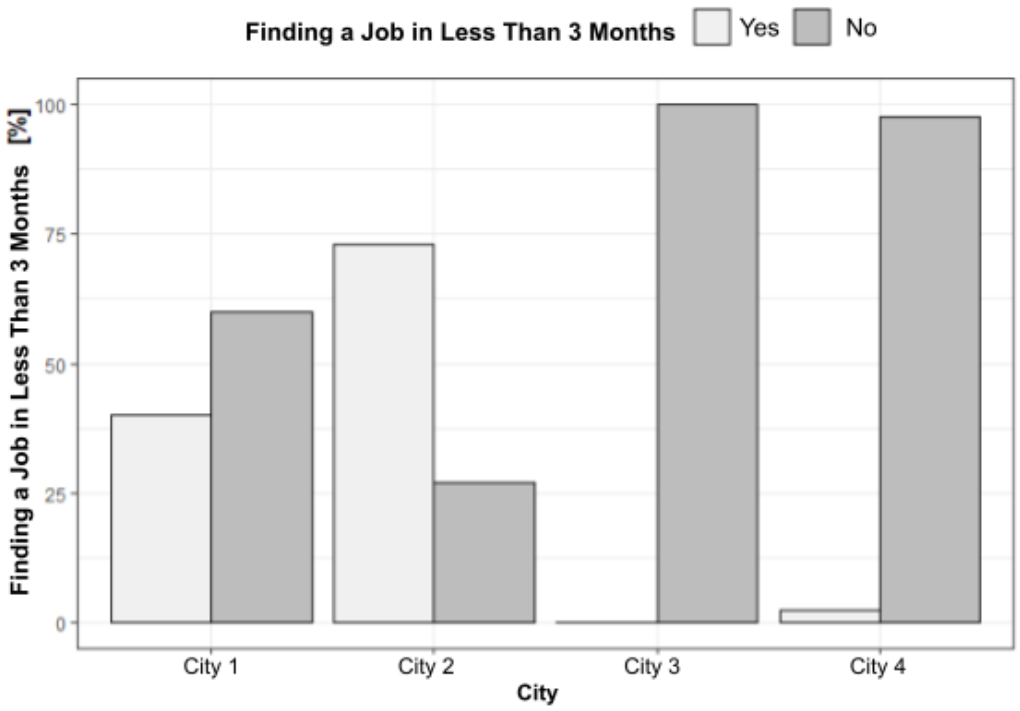

Figure 4. Relationship between Finding a Job in Less Than 3 Months by City (%)

Characteristics by Finding a Job in Less Than 3 Months

When dividing the data based on finding a job in less than 3 months, statistically significant differences were found for the following variables:

- City (Fisher p-value <0.001);
- Mode of study (chi-square p-value = 0.041);
- University in the Top 10 in Ranking X (chi-square p-value = 0.0026);
- Time to find a job (months) (U Mann-Whitney p-value <0.001).

Significantly more individuals found employment in less than 3 months compared to those seeking jobs for a longer duration in cities 1 and 2. Those who found a job in less than 3 months were more numerous than those who took longer to find employment in the case of full-time and evening studies, but there were twice as few in the part-time mode of study. Individuals who found a job in less than 3 months were significantly more likely to be enrolled in universities in the top 10 in Ranking X.

Table 4. Descriptive Characteristics by Period of Finding a Job

Variable	Parameter	Finding a Job in Less Than 3 Months	Finding a Job in More Than 3 Months	test	p-value
Gender	Male	52,3% (N=34)	54,8% (N=74)	Chi-square	0,8558
	Female	47,7% (N=31)	45,2% (N=61)		
Age	N	65	135	U Mann-Whitney	0,6792
	Mean (SD)	28,42 (4,38)	28,67 (3,8)		
	Median (IQR)	28 (25 - 32)	28 (26 - 31,5)		
	Range	22 - 35	22 - 35		
City	City 1	27,7% (N=18)	20% (N=27)	Fisher	**<0,001**
	City 2	70,8% (N=46)	12,6% (N=17)		
	City 3	0% (N=0)	36,3% (N=49)		
	City 4	1,5% (N=1)	31,1% (N=42)		
Type of University	University	38,5% (N=25)	54,1% (N=73)	Chi-square	0,0835
	Polytechnic	33,8% (N=22)	28,9% (N=39)		
	Other	27,7% (N=18)	17% (N=23)		
Mode of Study	Full-time	72,3% (N=47)	58,5% (N=79)	Chi-square	**0,041**
	Part-time	13,8% (N=9)	30,4% (N=41)		
	Evening	13,8% (N=9)	11,1% (N=15)		
Level	1	72,3% (N=47)	68,1% (N=92)	Chi-square	0,6639
	2	27,7% (N=18)	31,9% (N=43)		
Field of Study	Analytics	9,2% (N=6)	12,6% (N=17)	Chi-square	0,9476
	Big Data	10,8% (N=7)	12,6% (N=17)		
	Econometrics	12,3% (N=8)	11,9% (N=16)		
	Economics	10,8% (N=7)	11,1% (N=15)		
	Data Science	18,5% (N=12)	15,6% (N=21)		
	Mathematics	13,8% (N=9)	17% (N=23)		
	Applied Mathematics	24,6% (N=16)	19,3% (N=26)		

Variable	Parameter	Finding a Job in Less Than 3 Months	Finding a Job in More Than 3 Months	test	p-value
University in the Top 10 in Ranking X	Yes	64,6% (N=42)	40,7% (N=55)	Chi-square	**0,0026**
	No	35,4% (N=23)	59,3% (N=80)		
RStudio	Yes	49,2% (N=32)	57,8% (N=78)	Chi-square	0,324
	No	50,8% (N=33)	42,2% (N=57)		
Statistica	Yes	40% (N=26)	33,3% (N=45)	Chi-square	0,4442
	No	60% (N=39)	66,7% (N=90)		
Python	Yes	53,8% (N=35)	50,4% (N=68)	Chi-square	0,7568
	No	46,2% (N=30)	49,6% (N=67)		
Matlab	Yes	33,8% (N=22)	37,8% (N=51)	Chi-square	0,7009
	No	66,2% (N=43)	62,2% (N=84)		
Econometric Views	Yes	21,5% (N=14)	22,2% (N=30)	Chi-square	1
	No	78,5% (N=51)	77,8% (N=105)		
SPSS	Tak	23,1% (N=15)	37,8% (N=51)	Chi-square	0,0561
	Nie	76,9% (N=50)	62,2% (N=84)		
Time to Find Employment (months)	N	65	135	U Mann-Whitney	**<0,001**
	Mean (SD)	1,91 (0,95)	8,13 (2,75)		
	Median (IQR)	2 (1 - 3)	8 (5 - 11)		
	Range	0 - 3	4 - 12		
Industry	Market Research and Public Opinion	13,8% (N=9)	10,4% (N=14)	Fisher	0,6362
	Analytics	21,5% (N=14)	13,3% (N=18)		
	Academic Career	12,3% (N=8)	10,4% (N=14)		
	Accounting	10,8% (N=7)	12,6% (N=17)		
	Banking	13,8% (N=9)	16,3% (N=22)		
	IT - Programming	7,7% (N=5)	8,9% (N=12)		

Variable	Parameter	Finding a Job in Less Than 3 Months	Finding a Job in More Than 3 Months	test	p-value
	IT - Data Engineering	13,8% (N=9)	14,1% (N=19)		
	Other	6,2% (N=4)	14,1% (N=19)		
Satisfaction with Studies	1	6,2% (N=4)	12,6% (N=17)	Fisher	0,1484
	2	7,7% (N=5)	18,5% (N=25)		
	3	16,9% (N=11)	8,9% (N=12)		
	4	18,5% (N=12)	20% (N=27)		
	5	23,1% (N=15)	20% (N=27)		
	6	21,5% (N=14)	14,1% (N=19)		
	7	6,2% (N=4)	5,9% (N=8)		
Average GPA	N	65	135	U Mann-Whitney	0,2715
	Mean (SD)	4 (0,56)	4,09 (0,6)		
	Median (IQR)	4 (3,6 - 4,4)	4,2 (3,6 - 4,6)		
	Range	3 - 5	3 - 5		
Scholarship	Receiving Scholarship	20% (N=13)	22,2% (N=30)	Chi-square	0,8614
	No Scholarship	80% (N=52)	77,8% (N=105)		

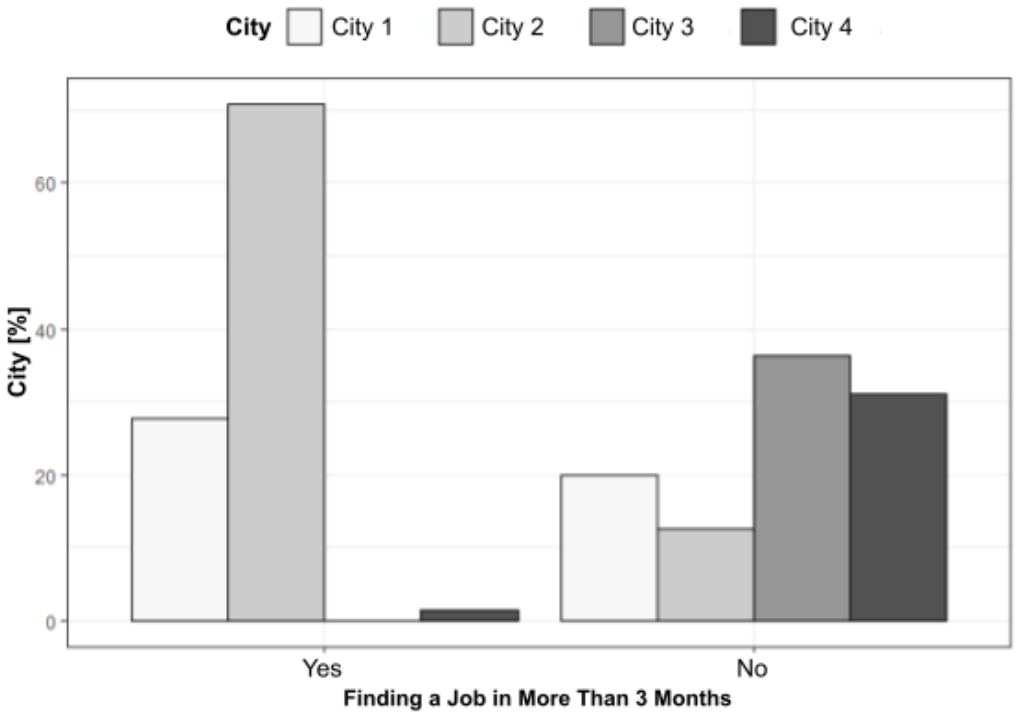

Figure 5. Relationship between the Number of Graduates in a Given City and Finding a Job in Less Than 3 Months (%)

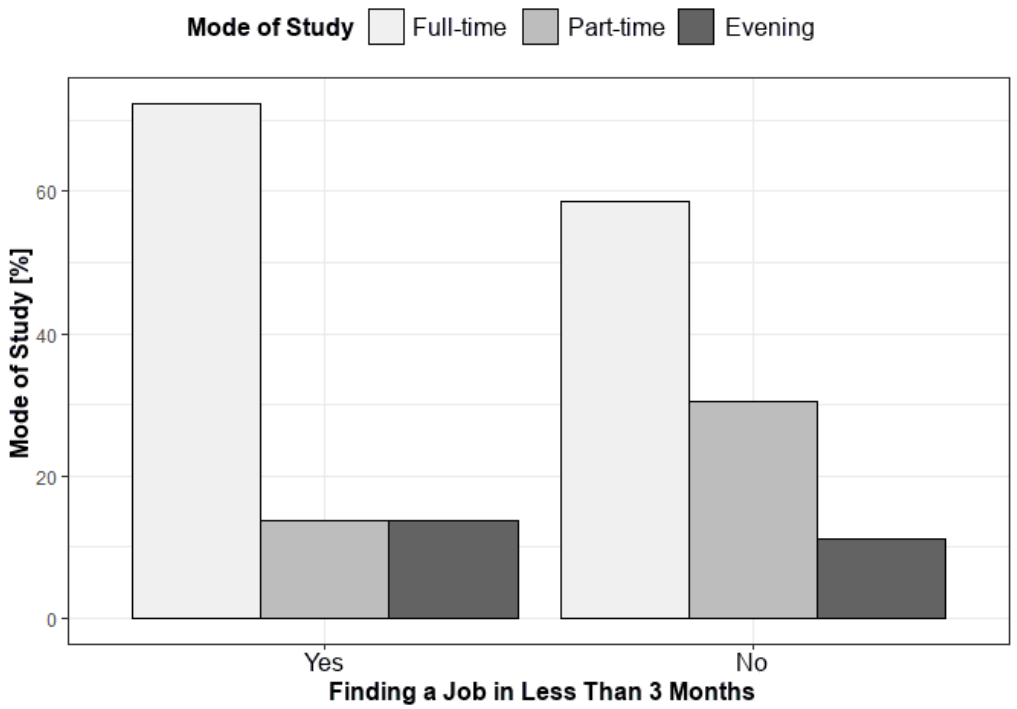

Figure 6. Relationship between the Number of Graduates in a Given Mode of Study and Finding a Job in Less Than 3 Months (%)

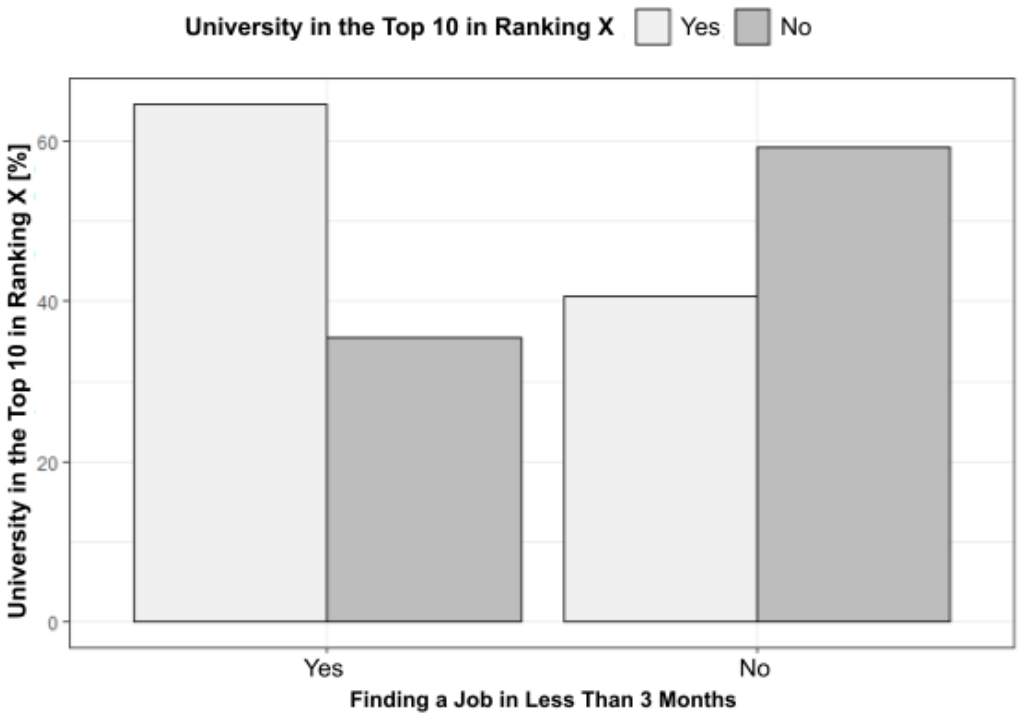

Figure 7. Relationship between the Number of Graduates from Universities in the Top 10 of Ranking X and Finding a Job in Less Than 3 Months (%)

Characteristics by Type of University

Considering the division by university types, statistically significant differences were found for the following variables:

- Field of Study (chi-square p-value <0.001);
- RStudio (chi-square p-value <0.001);
- Statistica (chi-square p-value <0.001);
- Python (Fisher p-value <0.001);
- Matlab (chi-square p-value <0.001);
- Econometric Views (Fisher p-value = 0.0025);
- SPSS (chi-square p-value <0.001);
- Average GPA (Kruskal-Wallis p-value = 0.0056);
- Scholarship (chi-square p-value = 0.0074).

Fields such as analytics, big data, econometrics, economics, and mathematics were not present at polytechnics, while engineering and data analysis, as well as applied mathematics, were absent at universities. The percentages of individuals with skills in using RStudio, Python, and Matlab were highest at polytechnics. Programs like Statistica, Econometric Views, and SPSS dominated at universities. The highest average GPA and the largest percentage of scholarship recipients were among students at institutions other than polytechnics or universities. Scholarships were most frequently awarded to students from other types of institutions rather than universities and polytechnics.

Table 5. Descriptive Characteristics by Type of University

Variable	Parameter	University (N=98)	Polytechnic (N=61)	Other (N=41)	test	p-value
Gender	Male	53,1% (N=52)	55,7% (N=34)	53,7% (N=22)	Chi-square	0,9461
	Female	46,9% (N=46)	44,3% (N=27)	46,3% (N=19)		
Age	N	98	61	41	Kruskal-Wallis	0,6419
	Mean (SD)	28,44 (4,15)	28,98 (3,79)	28,34 (3,95)		
	Median (IQR)	28 (25 - 32)	29 (26 - 32)	28 (25 - 32)		
	Range	22 - 35	22 - 35	22 - 35		
City	City 1	22,4% (N=22)	26,2% (N=16)	17,1% (N=7)	Chi-square	0,2848
	City 2	25,5% (N=25)	31,1% (N=19)	46,3% (N=19)		
	City 3	29,6% (N=29)	19,7% (N=12)	19,5% (N=8)		
	City 4	22,4% (N=22)	23% (N=14)	17,1% (N=7)		
Mode of Study	Full-time	65,3% (N=64)	60,7% (N=37)	61% (N=25)	Chi-square	0,464
	Part-time	24,5% (N=24)	29,5% (N=18)	19,5% (N=8)		
	Evening	10,2% (N=10)	9,8% (N=6)	19,5% (N=8)		

Variable	Parameter	University (N=98)	Polytechnic (N=61)	Other (N=41)	test	p-value
Level	1	65,3% (N=64)	72,1% (N=44)	75,6% (N=31)	Chi-square	0,4201
	2	34,7% (N=34)	27,9% (N=17)	24,4% (N=10)		
Field of Study	Analytics	14,3% (N=14)	0% (N=0)	22% (N=9)	Chi-square	**<0,001**
	Big Data	20,4% (N=20)	0% (N=0)	9,8% (N=4)		
	Econometrics	18,4% (N=18)	0% (N=0)	14,6% (N=6)		
	Economics	20,4% (N=20)	0% (N=0)	4,9% (N=2)		
	Data Science	0% (N=0)	42,6% (N=26)	17,1% (N=7)		
	Mathematics	26,5% (N=26)	0% (N=0)	14,6% (N=6)		
	Applied Mathematics	0% (N=0)	57,4% (N=35)	17,1% (N=7)		
University in the Top 10 in Ranking X	Yes	50% (N=49)	47,5% (N=29)	46,3% (N=19)	Chi-square	0,9106
	No	50% (N=49)	52,5% (N=32)	53,7% (N=22)		
RStudio	Yes	43,9% (N=43)	80,3% (N=49)	43,9% (N=18)	Chi-square	**<0,001**
	No	56,1% (N=55)	19,7% (N=12)	56,1% (N=23)		
Statistica	Yes	46,9% (N=46)	14,8% (N=9)	39% (N=16)	Chi-square	**<0,001**
	No	53,1% (N=52)	85,2% (N=52)	61% (N=25)		
Python	Yes	22,4% (N=22)	100% (N=61)	48,8% (N=20)	Fisher	**<0,001**

Variable	Parameter	University (N=98)	Polytechnic (N=61)	Other (N=41)	test	p-value
	No	77,6% (N=76)	0% (N=0)	51,2% (N=21)		
Matlab	Yes	20,4% (N=20)	63,9% (N=39)	34,1% (N=14)	Chi-square	**<0,001**
	No	79,6% (N=78)	36,1% (N=22)	65,9% (N=27)		
Econometric Views	Yes	30,6% (N=30)	8,2% (N=5)	22% (N=9)	Fisher	**0,0025**
	No	69,4% (N=68)	91,8% (N=56)	78% (N=32)		
SPSS	Yes	45,9% (N=45)	14,8% (N=9)	29,3% (N=12)	Chi-square	**<0,001**
	No	54,1% (N=53)	85,2% (N=52)	70,7% (N=29)		
Time to Find Employment (months)	N	98	61	41	Kruskal-Wallis	0,1089
	Mean (SD)	6,61 (3,75)	5,93 (3,7)	5,15 (3,6)		
	Median (IQR)	7 (3,25 - 10)	6 (2 - 9)	4 (3 - 7)		
	Range	0 - 12	0 - 12	1 - 12		
Finding a Job in Less Than 3 Months	Yes	25,5% (N=25)	36,1% (N=22)	43,9% (N=18)	Chi-square	0,0835
	No	74,5% (N=73)	63,9% (N=39)	56,1% (N=23)		
Industry	Market Research and Public Opinion	12,2% (N=12)	6,6% (N=4)	17,1% (N=7)	Chi-square	0,3598
	Analytics	16,3% (N=16)	14,8% (N=9)	17,1% (N=7)		
	Academic Career	13,3% (N=13)	9,8% (N=6)	7,3% (N=3)		
	Accounting	14,3% (N=14)	14,8% (N=9)	2,4% (N=1)		

Variable	Parameter	University (N=98)	Polytechnic (N=61)	Other (N=41)	test	p-value
	Banking	12,2% (N=12)	18% (N=11)	19,5% (N=8)		
	IT - Programming	6,1% (N=6)	6,6% (N=4)	17,1% (N=7)		
	IT - Data Engineering	14,3% (N=14)	18% (N=11)	7,3% (N=3)		
	Other	11,2% (N=11)	11,5% (N=7)	12,2% (N=5)		
Satisfaction with Studies	1	10,2% (N=10)	13,1% (N=8)	7,3% (N=3)	Chi-square	0,4854
	2	10,2% (N=10)	18% (N=11)	22% (N=9)		
	3	14,3% (N=14)	8,2% (N=5)	9,8% (N=4)		
	4	20,4% (N=20)	13,1% (N=8)	26,8% (N=11)		
	5	20,4% (N=20)	21,3% (N=13)	22% (N=9)		
	6	16,3% (N=16)	21,3% (N=13)	9,8% (N=4)		
	7	8,2% (N=8)	4,9% (N=3)	2,4% (N=1)		
Average GPA	N	98	61	41	Kruskal-Wallis	**0,0056**
	Mean (SD)	3,94 (0,56)	4,1 (0,61)	4,28 (0,57)		
	Median (IQR)	4 (3,4 - 4,4)	4,2 (3,6 - 4,6)	4,4 (3,9 - 4,7)		
	Range	3 - 5	3 - 5	3 - 5		
Stypendium	Receiving Scholarship	13,3% (N=13)	24,6% (N=15)	36,6% (N=15)	Chi-square	**0,0074**
	No Scholarship	86,7% (N=85)	75,4% (N=46)	63,4% (N=26)		

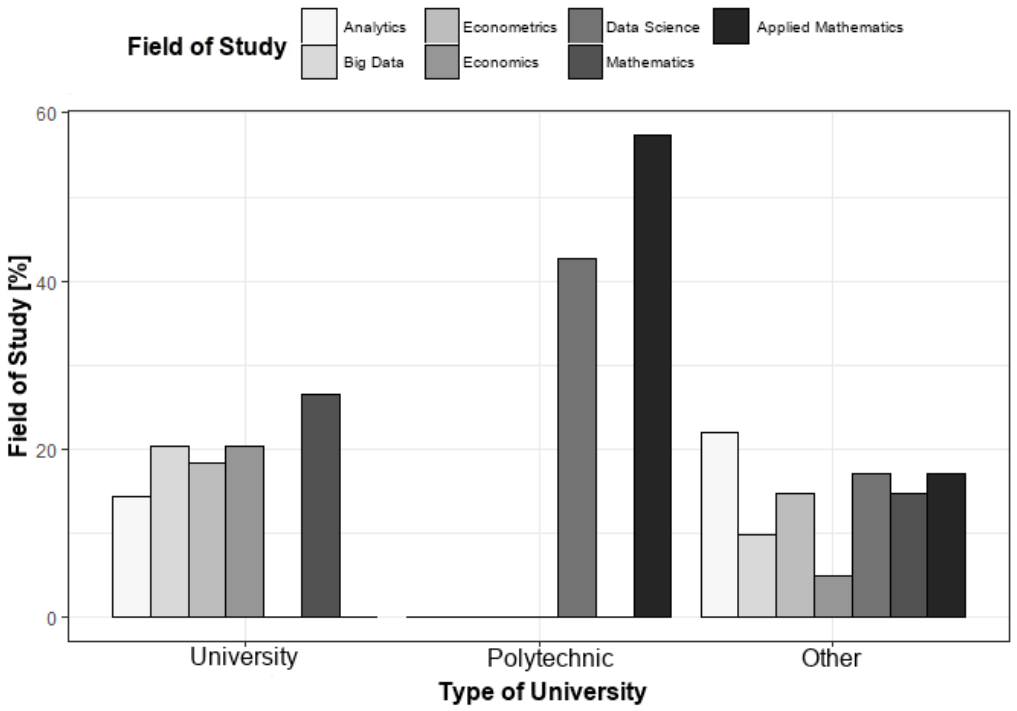

Figure 8. Relationship between the Number of Graduates in a Specific Major and Type of University (%)

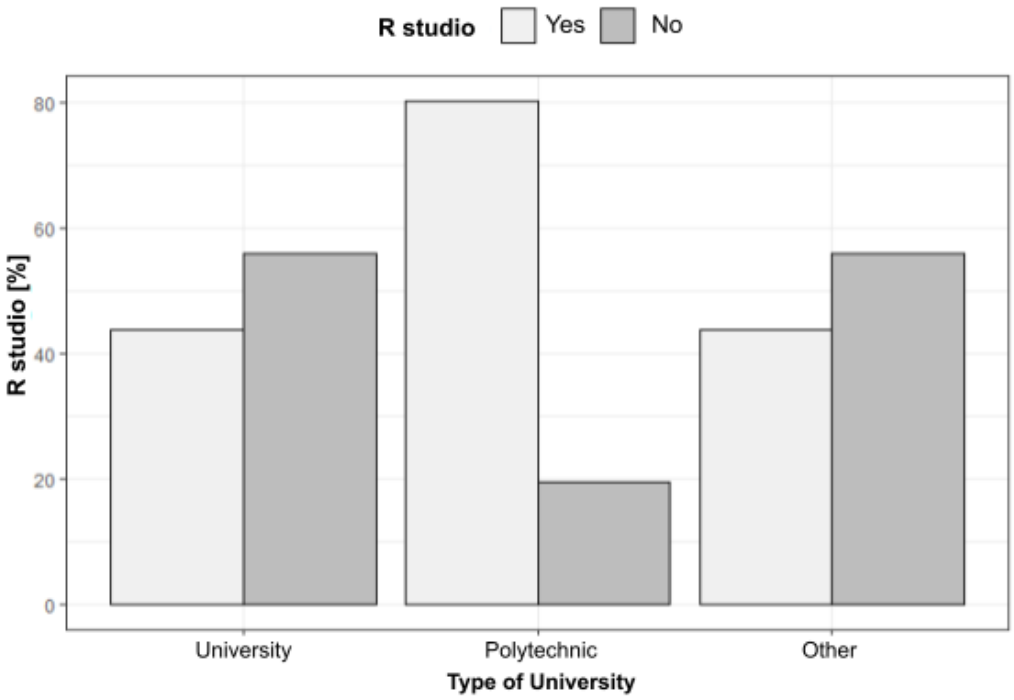

Figure 9. Relationship between Proficiency in RStudio Software and Type of University (%)

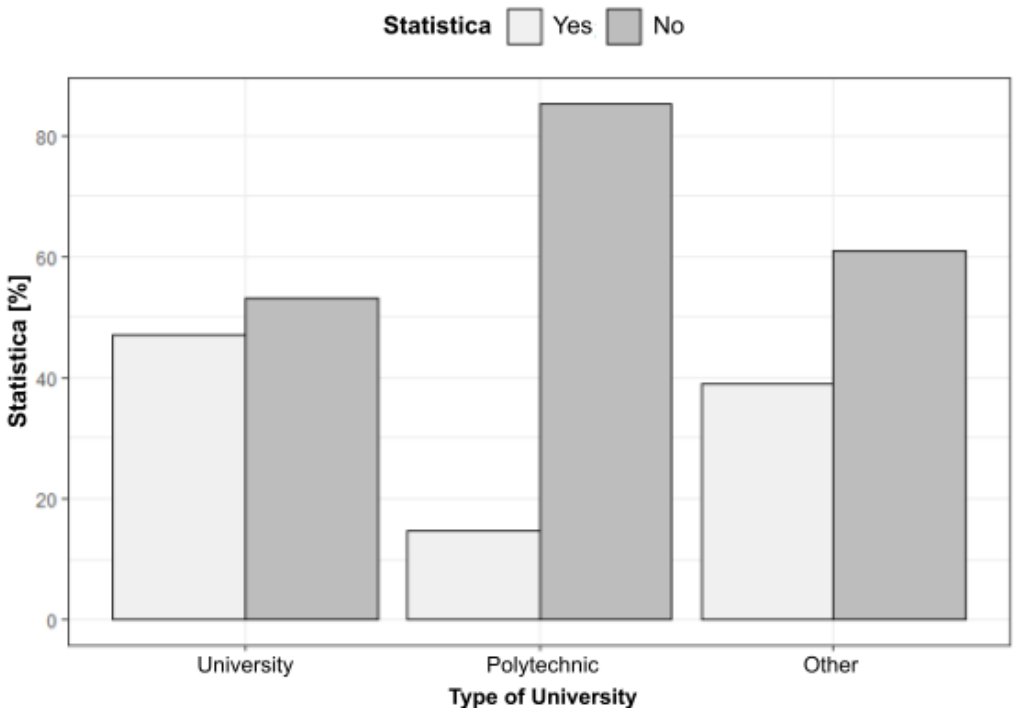

Figure 10. Relationship between Proficiency in Statistica Software and Type of University (%)

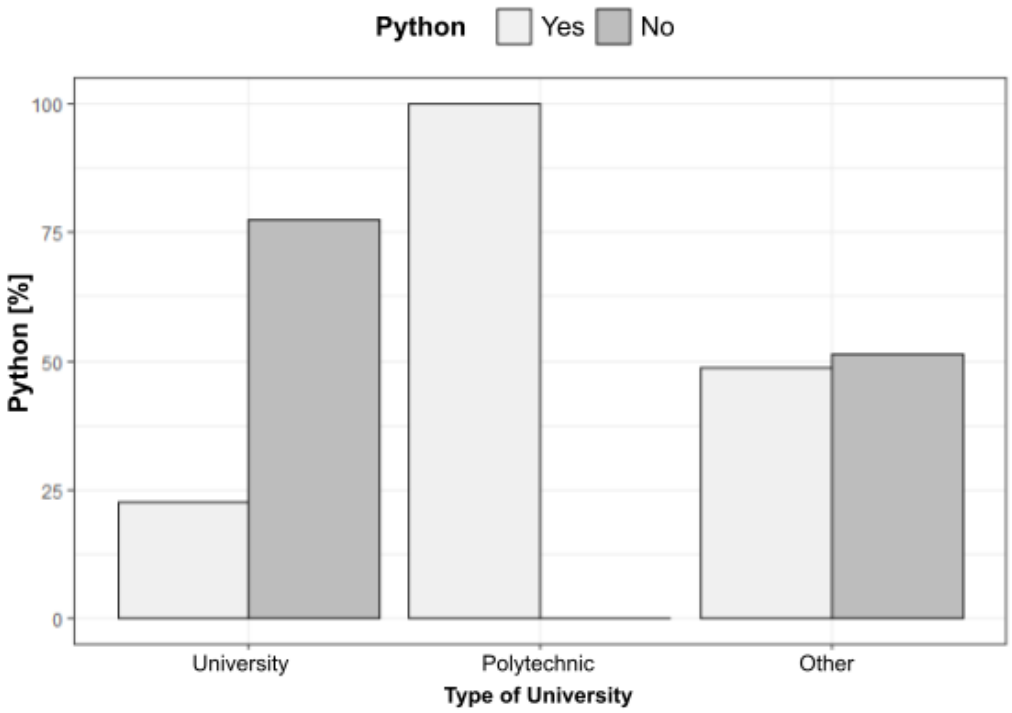

Figure 11. Relationship between Proficiency in Python Language and Type of University (%)

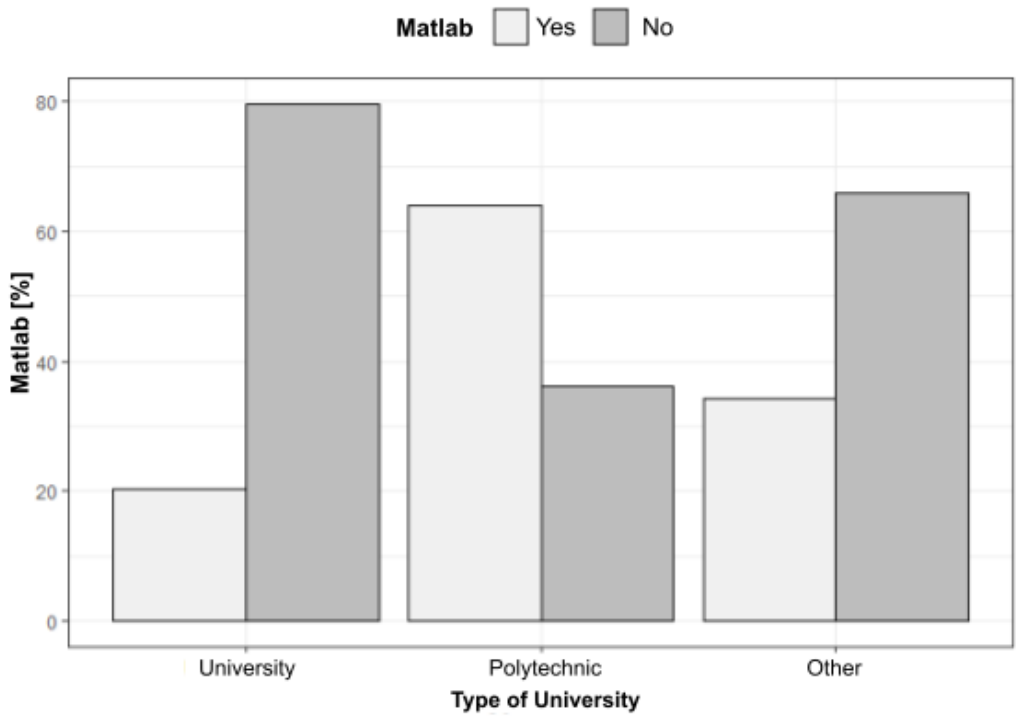

Figure 12. Relationship between Proficiency in Matlab Software and Type of University (%)

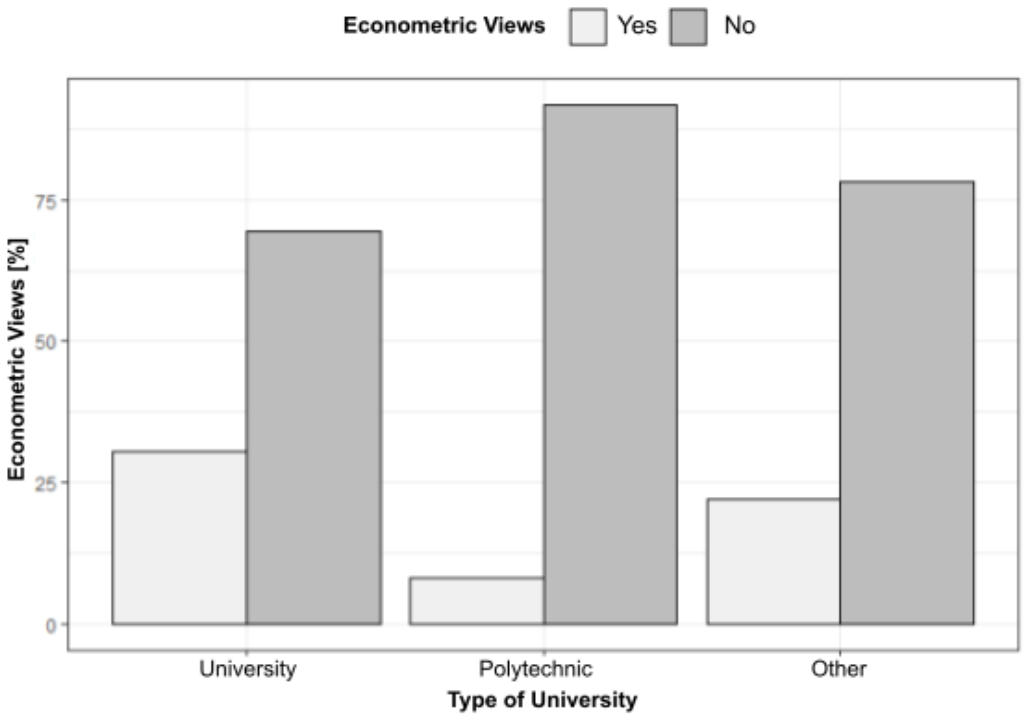

Figure 13. Relationship between Proficiency in Econometric Views Software and Type of University (%)

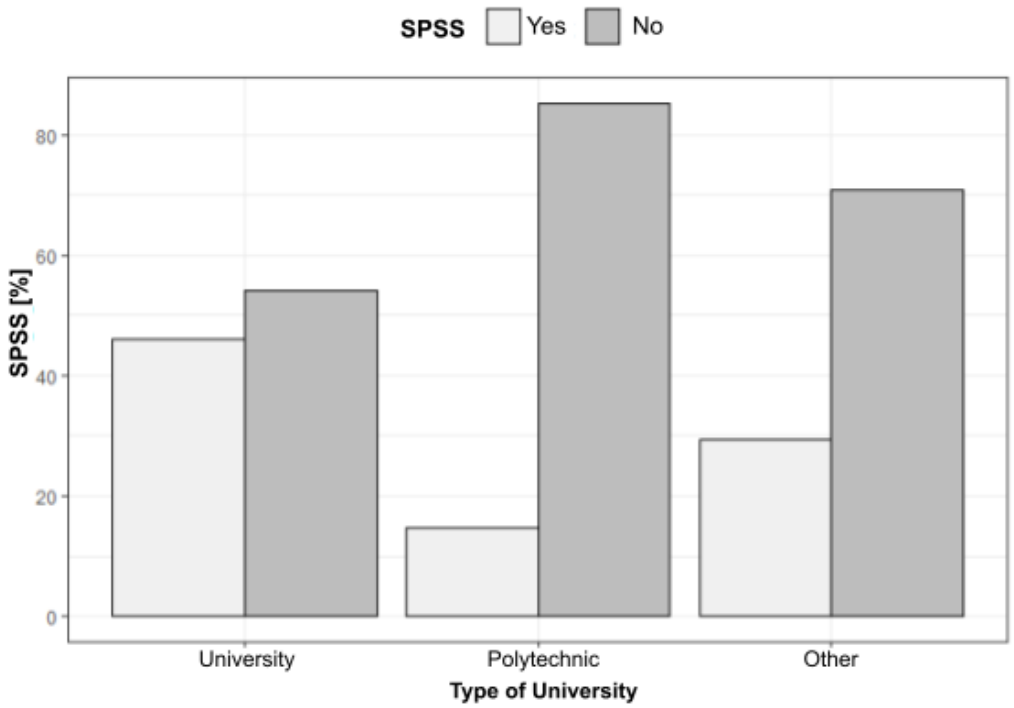

Figure 14. Relationship between Learning SPSS Software and Type of University (%)

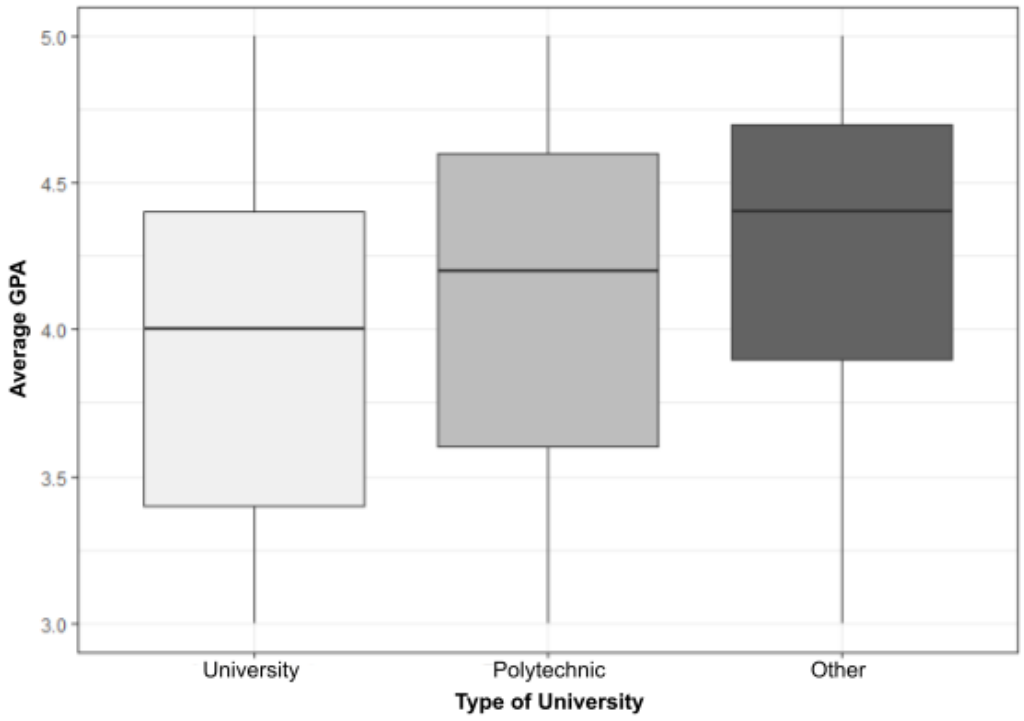

Figure 15. Relationship between Average GPA and Type of University (%)

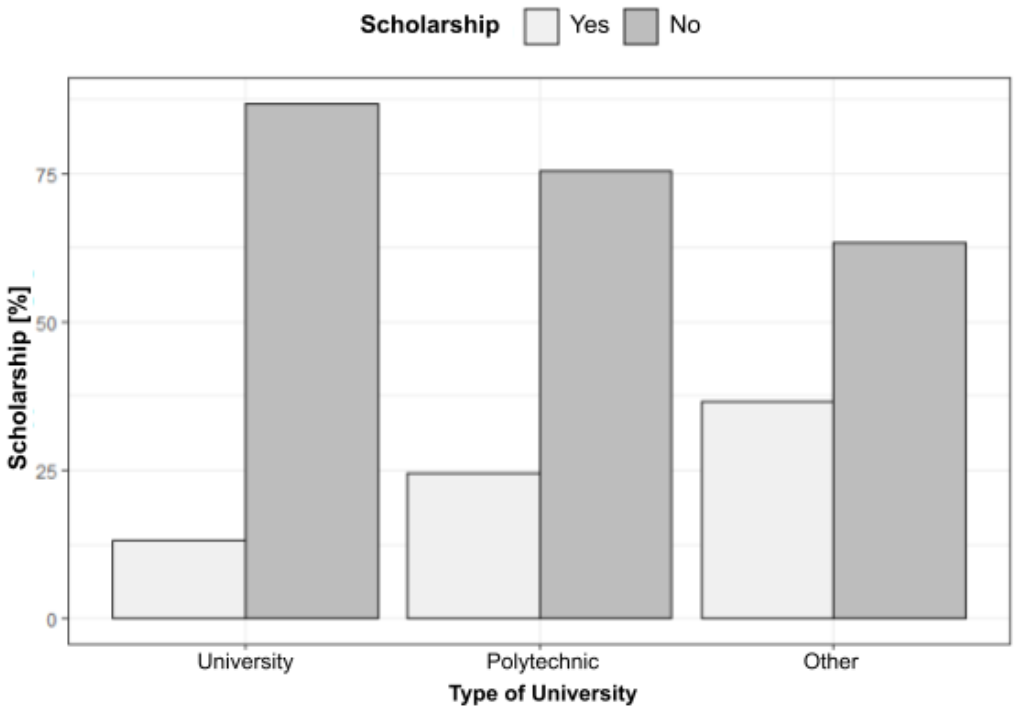

Figure 16. Relationship between Having a Scholarship and the Type of University (%)

Characteristics by Mode of Study

When analyzing the data based on the mode of study, statistically significant differences were found for the following variables:

- Field of Study (chi-square p-value = 0.0307);
- Finding a Job in Less Than 3 Months (chi-square p-value = 0.041);
- Scholarship (chi-square p-value = 0.0389).

Analytics and data engineering were most frequently conducted in the evening mode of study, while big data and econometrics were more common in full-time mode. Other majors were primarily offered in part-time mode. Finding a job in less than 3 months was easiest for students studying in full-time and evening modes. Students in full-time programs received scholarships half as often as their peers in part-time or evening programs.

Table 6. Descriptive Characteristics by Mode of Study

Variable	Parameter	Full-time (N=126)	Part-time (N=50)	Evening (N=24)	test	p-value
Gender	Male	54,8% (N=69)	54% (N=27)	50% (N=12)	Chi-square	0,9121
	Female	45,2% (N=57)	46% (N=23)	50% (N=12)		
Age	N	126	50	24	Kruskal-Wallis	0,8756
	Mean (SD)	28,68 (3,9)	28,44 (4,01)	28,38 (4,56)		
	Median (IQR)	29 (26 - 32)	27,5 (25 - 31)	27 (24,75 - 33)		
	Range	22 - 35	22 - 35	22 - 35		
City	City 1	21,4% (N=27)	18% (N=9)	37,5% (N=9)	Fisher	0,1113
	City 2	36,5% (N=46)	22% (N=11)	25% (N=6)		
	City 3	24,6% (N=31)	30% (N=15)	12,5% (N=3)		
	City 4	17,5% (N=22)	30% (N=15)	25% (N=6)		
Type of University	University	50,8% (N=64)	48% (N=24)	41,7% (N=10)	Chi-square	0,464
	Polytechnic	29,4% (N=37)	36% (N=18)	25% (N=6)		
	Other	19,8% (N=25)	16% (N=8)	33,3% (N=8)		
Level	1	69,8% (N=88)	64% (N=32)	79,2% (N=19)	Fisher	0,4217
	2	30,2% (N=38)	36% (N=18)	20,8% (N=5)		
Field of Study	Analytics	11,9% (N=15)	6% (N=3)	20,8% (N=5)	Chi-square	**0,0312**
	Big Data	14,3% (N=18)	8% (N=4)	8,3% (N=2)		

Variable	Parameter	Full-time (N=126)	Part-time (N=50)	Evening (N=24)	test	p-value
	Econometrics	15,1% (N=19)	4% (N=2)	12,5% (N=3)		
	Economics	8,7% (N=11)	16% (N=8)	12,5% (N=3)		
	Data Science	14,3% (N=18)	14% (N=7)	33,3% (N=8)		
	Mathematics	14,3% (N=18)	24% (N=12)	8,3% (N=2)		
	Applied Mathematics	21,4% (N=27)	28% (N=14)	4,2% (N=1)		
University in the Top 10 in Ranking X	Yes	48,4% (N=61)	50% (N=25)	45,8% (N=11)	Chi-square	0,9447
	No	51,6% (N=65)	50% (N=25)	54,2% (N=13)		
RStudio	Yes	56,3% (N=71)	56% (N=28)	45,8% (N=11)	Chi-square	0,6289
	No	43,7% (N=55)	44% (N=22)	54,2% (N=13)		
Statistica	Yes	37,3% (N=47)	26% (N=13)	45,8% (N=11)	Chi-square	0,1951
	No	62,7% (N=79)	74% (N=37)	54,2% (N=13)		
Python	Yes	49,2% (N=62)	58% (N=29)	50% (N=12)	Chi-square	0,5676
	No	50,8% (N=64)	42% (N=21)	50% (N=12)		
Matlab	Yes	33,3% (N=42)	46% (N=23)	33,3% (N=8)	Chi-square	0,2731
	No	66,7% (N=84)	54% (N=27)	66,7% (N=16)		
Econometric Views	Yes	19,8% (N=25)	20% (N=10)	37,5% (N=9)	Chi-square	0,1482

Variable	Parameter	Full-time (N=126)	Part-time (N=50)	Evening (N=24)	test	p-value
	No	80,2% (N=101)	80% (N=40)	62,5% (N=15)		
SPSS	Yes	31% (N=39)	36% (N=18)	37,5% (N=9)	Chi-square	0,7181
	No	69% (N=87)	64% (N=32)	62,5% (N=15)		
Time to Find Employment (months)	N	126	50	24	Kruskal-Wallis	0,2896
	Mean (SD)	5,84 (3,82)	6,8 (3,36)	6,04 (3,91)		
	Median (IQR)	5 (2,25 - 9,75)	7 (5 - 9,75)	5,5 (3 - 10)		
	Range	0 - 12	0 - 12	0 - 12		
Finding a Job in Less Than 3 Months	Yes	37,3% (N=47)	18% (N=9)	37,5% (N=9)	Chi-square	**0,041**
	No	62,7% (N=79)	82% (N=41)	62,5% (N=15)		
Industry	Market Research and Public Opinion	11,1% (N=14)	16% (N=8)	4,2% (N=1)	Chi-square	0,7541
	Analytics	15,1% (N=19)	18% (N=9)	16,7% (N=4)		
	Academic Career	13,5% (N=17)	6% (N=3)	8,3% (N=2)		
	Accounting	13,5% (N=17)	12% (N=6)	4,2% (N=1)		
	Banking	13,5% (N=17)	20% (N=10)	16,7% (N=4)		
	IT - Programming	7,9% (N=10)	6% (N=3)	16,7% (N=4)		
	IT - Data Engineering	13,5% (N=17)	14% (N=7)	16,7% (N=4)		
	Other	11,9% (N=15)	8% (N=4)	16,7% (N=4)		

Variable	Parameter	Full-time (N=126)	Part-time (N=50)	Evening (N=24)	test	p-value
Satisfaction with Studies	1	10,3% (N=13)	14% (N=7)	4,2% (N=1)	Chi-square	0,5675
	2	12,7% (N=16)	16% (N=8)	25% (N=6)		
	3	15,1% (N=19)	2% (N=1)	12,5% (N=3)		
	4	20,6% (N=26)	20% (N=10)	12,5% (N=3)		
	5	19% (N=24)	26% (N=13)	20,8% (N=5)		
	6	16,7% (N=21)	16% (N=8)	16,7% (N=4)		
	7	5,6% (N=7)	6% (N=3)	8,3% (N=2)		
Average GPA	N	126	50	24	Kruskal-Wallis	0,5279
	Mean (SD)	4,03 (0,54)	4,14 (0,66)	4,03 (0,69)		
	Median (IQR)	4,1 (3,62 - 4,4)	4,1 (3,6 - 4,77)	3,9 (3,4 - 4,73)		
	Range	3 - 5	3 - 5	3 - 5		
Scholarship	Receiving Scholarship	15,9% (N=20)	30% (N=15)	33,3% (N=8)	Chi-square	**0,0389**
	No Scholarship	84,1% (N=106)	70% (N=35)	66,7% (N=16)		

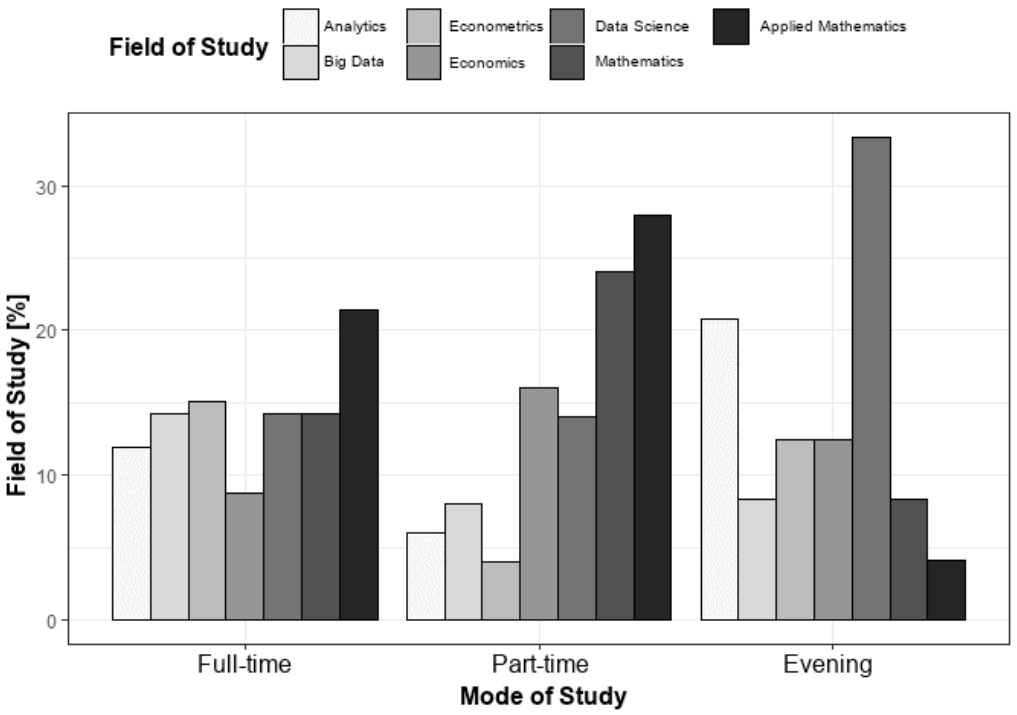

Figure 17. Relationship between Studying Specific Majors and Mode of Study (%)

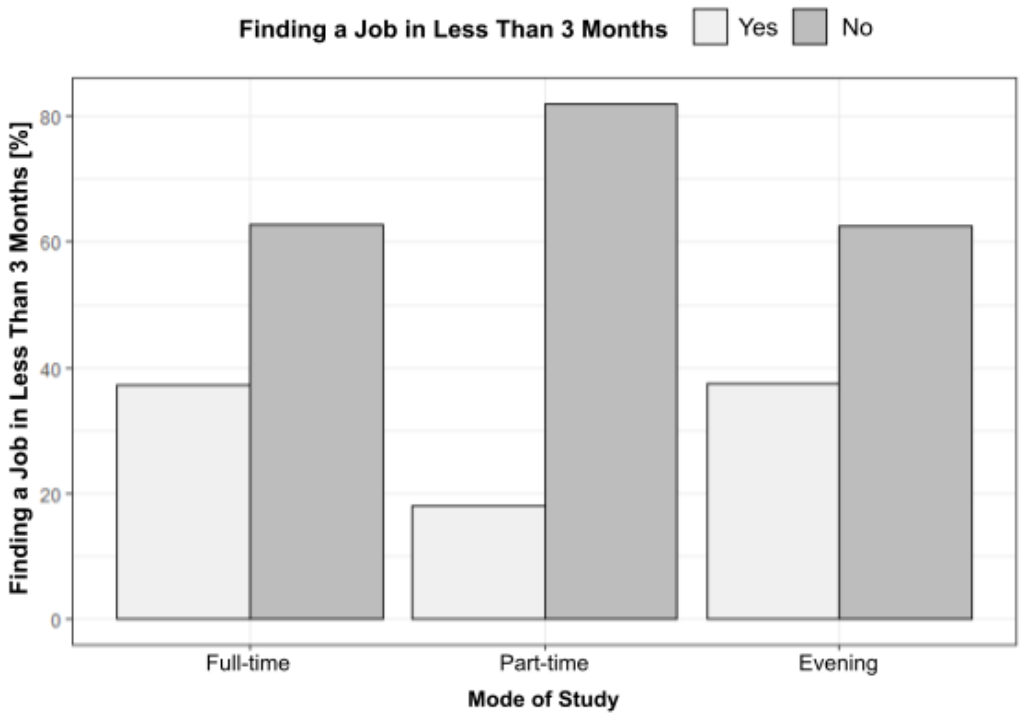

Figure 18. Relationship between the Number of Individuals Who Found a Job in Less Than 3 Months and Mode of Study (%)

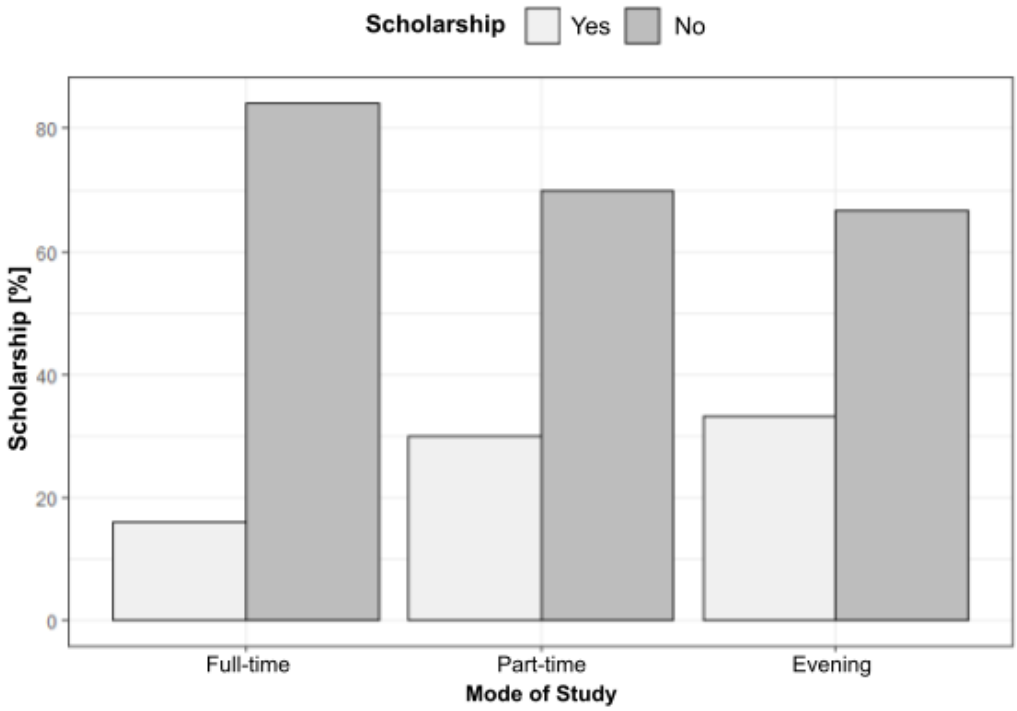

Figure 19. Dependency of Having a Scholarship on the Mode of Study (%)

Characteristics by Having a Scholarship

When dividing the data based on having a scholarship, statistically significant differences were found for the following variables:

- Mode of Study (chi-square p-value = 0.0389);
- Type of University (chi-square p-value = 0.0074);
- Python (chi-square p-value = 0.0113);
- Average GPA (U Mann-Whitney p-value <0.001).

A higher percentage of students had scholarships in part-time and evening study programs. The percentage of scholarship recipients was lower at universities compared to polytechnics or other types of institutions. Proficiency in the Python programming language was more common among scholarship recipients. Their average GPA was noticeably higher.

Table 7. Descriptive characteristics divided by having a scholarship.

Variable	Parameter	Receiving Scholarship (N=43)	No Scholarship (N=157)	test	p-value
Gender	Male	53,5% (N=23)	54,1% (N=85)	Chi-square	1
	Female	46,5% (N=20)	45,9% (N=72)		
Age	N	43	157	U Mann-Whitney	0,1088
	Mean (SD)	29,47 (4,13)	28,34 (3,93)		
	Median (IQR)	30 (26 - 33)	28 (25 - 31)		
	Range	22 - 35	22 - 35		
City	City 1	30,2% (N=13)	20,4% (N=32)	Chi-square	0,106
	City 2	20,9% (N=9)	34,4% (N=54)		
	City 3	18,6% (N=8)	26,1% (N=41)		
	City 4	30,2% (N=13)	19,1% (N=30)		
Mode of Study	Full-time	46,5% (N=20)	67,5% (N=106)	Chi-square	**0,0389**
	Part-time	34,9% (N=15)	22,3% (N=35)		
	Evening	18,6% (N=8)	10,2% (N=16)		
Type of University	University	30,2% (N=13)	54,1% (N=85)	Chi-square	**0,0074**
	Polytechnic	34,9% (N=15)	29,3% (N=46)		
	Other	34,9% (N=15)	16,6% (N=26)		
Level	1	62,8% (N=27)	71,3% (N=112)	Chi-square	0,3726
	2	37,2% (N=16)	28,7% (N=45)		
Field of Study	Analytics	11,6% (N=5)	11,5% (N=18)	Fisher	0,5008
	Big Data	16,3% (N=7)	10,8% (N=17)		
	Econometrics	4,7% (N=2)	14% (N=22)		
	Economics	11,6% (N=5)	10,8% (N=17)		
	Data Science	16,3% (N=7)	16,6% (N=26)		
	Mathematics	11,6% (N=5)	17,2% (N=27)		
	Applied Mathematics	27,9% (N=12)	19,1% (N=30)		
University in the Top 10 in Ranking X	Yes	55,8% (N=24)	46,5% (N=73)	Chi-square	0,3623
	No	44,2% (N=19)	53,5% (N=84)		
RStudio	Yes	62,8% (N=27)	52,9% (N=83)	Chi-square	0,3241
	No	37,2% (N=16)	47,1% (N=74)		

Variable	Parameter	Receiving Scholarship (N=43)	No Scholarship (N=157)	test	p-value
Statistica	Yes	32,6% (N=14)	36,3% (N=57)	Chi-square	0,7832
	No	67,4% (N=29)	63,7% (N=100)		
Python	Yes	69,8% (N=30)	46,5% (N=73)	Chi-square	**0,0113**
	No	30,2% (N=13)	53,5% (N=84)		
Matlab	Yes	41,9% (N=18)	35% (N=55)	Chi-square	0,5187
	No	58,1% (N=25)	65% (N=102)		
Econometric Views	Yes	16,3% (N=7)	23,6% (N=37)	Chi-square	0,4154
	No	83,7% (N=36)	76,4% (N=120)		
SPSS	Yes	32,6% (N=14)	33,1% (N=52)	Chi-square	1
	No	67,4% (N=29)	66,9% (N=105)		
Time to Find Employment (months)	N	43	157	U Mann-Whitney	0,8719
	Mean (SD)	5,98 (3,45)	6,14 (3,81)		
	Median (IQR)	6 (3 - 8)	5 (3 - 10)		
	Range	0 - 12	0 - 12		
Finding a Job in Less Than 3 Months	Yes	30,2% (N=13)	33,1% (N=52)	Chi-square	0,8614
	No	69,8% (N=30)	66,9% (N=105)		
Industry	Market Research and Public Opinion	11,6% (N=5)	11,5% (N=18)	Fisher	0,7521
	Analytics	16,3% (N=7)	15,9% (N=25)		
	Academic Career	11,6% (N=5)	10,8% (N=17)		
	Accounting	7% (N=3)	13,4% (N=21)		
	Banking	18,6% (N=8)	14,6% (N=23)		
	IT - Programming	14% (N=6)	7% (N=11)		
	IT - Data Engineering	9,3% (N=4)	15,3% (N=24)		
	Other	11,6% (N=5)	11,5% (N=18)		
Satisfaction with Studies	1	4,7% (N=2)	12,1% (N=19)	Fisher	0,3917
	2	14% (N=6)	15,3% (N=24)		
	3	14% (N=6)	10,8% (N=17)		
	4	27,9% (N=12)	17,2% (N=27)		

Variable	Parameter	Receiving Scholarship (N=43)	No Scholarship (N=157)	test	p-value
	5	25,6% (N=11)	19,7% (N=31)		
	6	11,6% (N=5)	17,8% (N=28)		
	7	2,3% (N=1)	7% (N=11)		
Average GPA	N	43	157	U Mann-Whitney	**<0,001**
	Mean (SD)	4,84 (0,12)	3,85 (0,48)		
	Median (IQR)	4,8 (4,7 - 4,9)	3,9 (3,4 - 4,2)		
	Range	4,7 - 5	3 - 4,6		

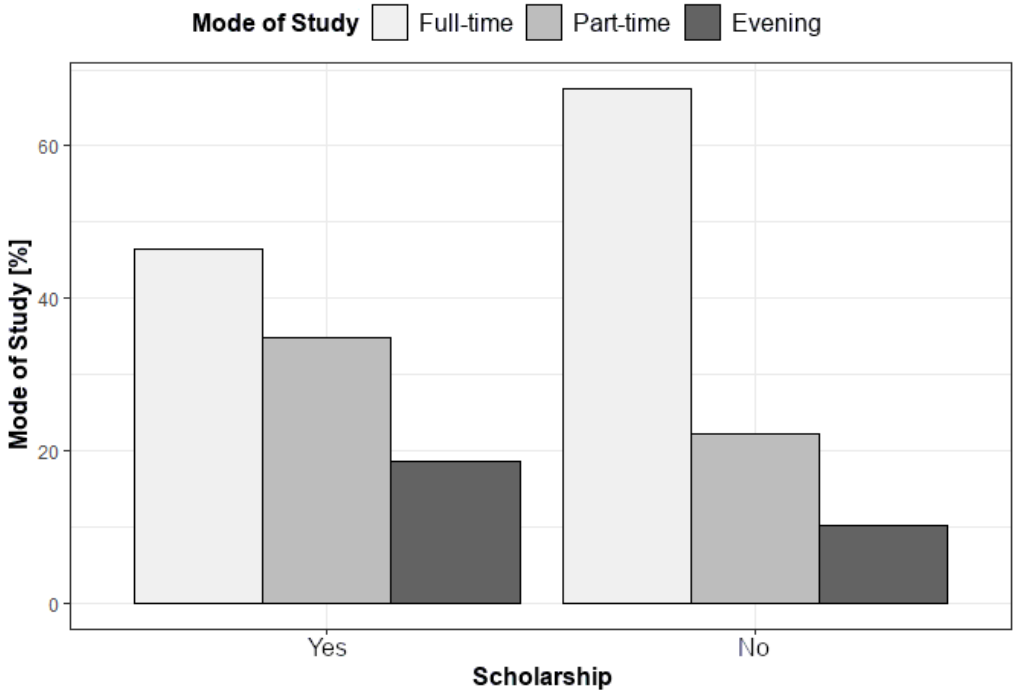

Figure 20. Relationship between Enrolling in a Specific Mode of Study and Scholarship Possession (%)

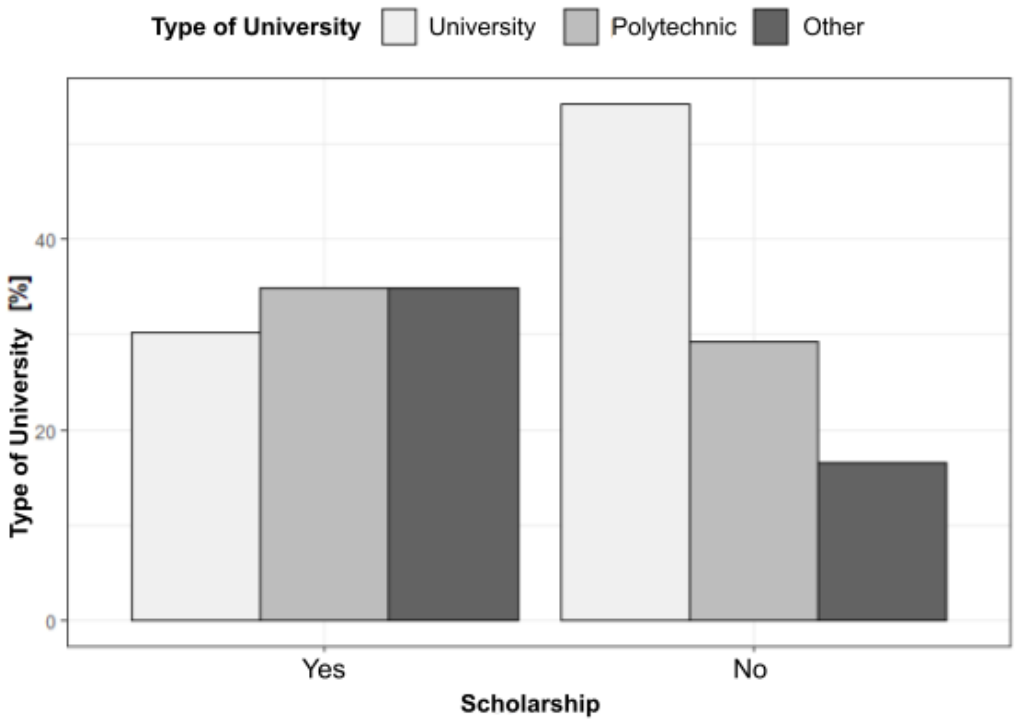

Figure 21. Relationship between Pursuing Studies at a Specific Type of University and Scholarship Possession (%)

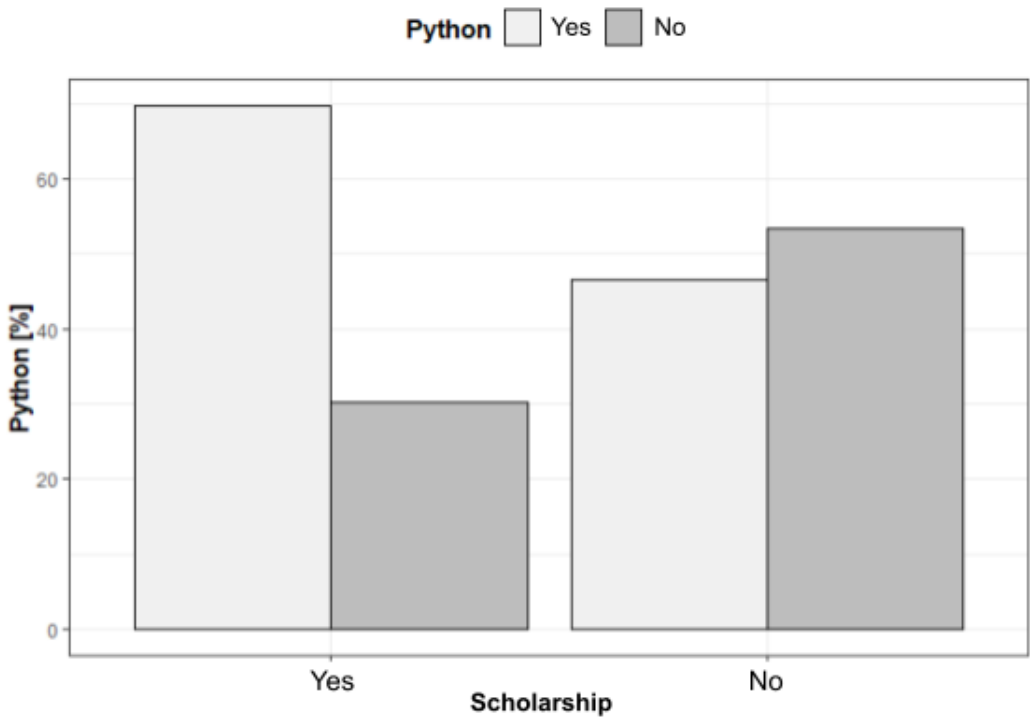

Figure 22. Relationship between Proficiency in Python Programming Language and Scholarship Possession (%)

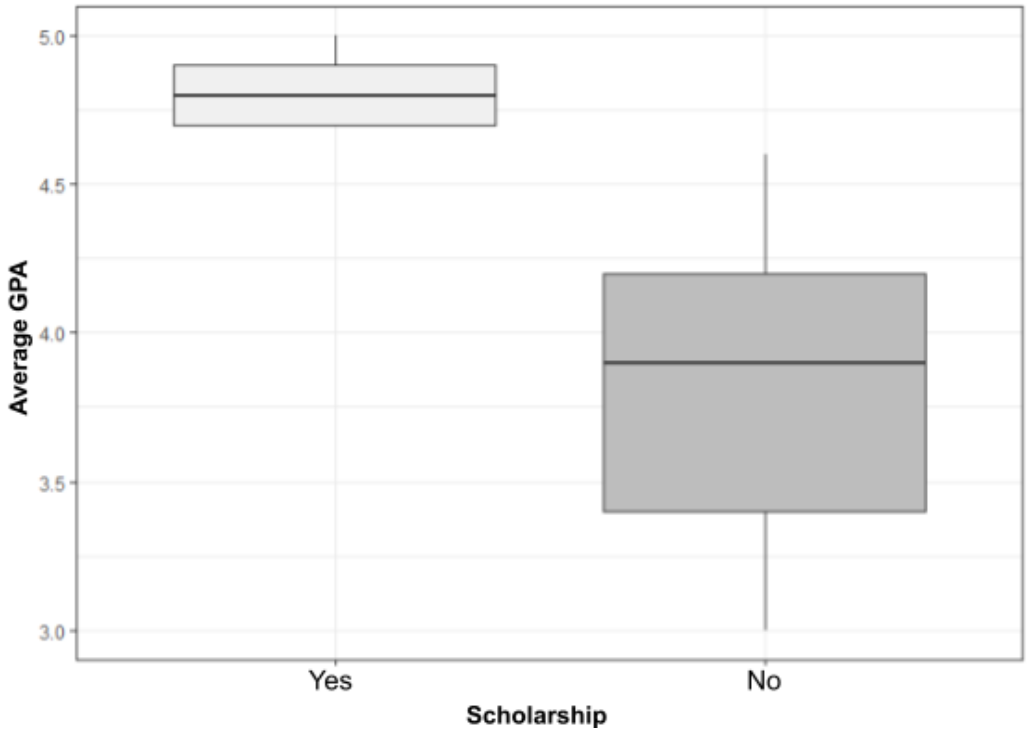

Figure 23. Relationship between Average GPA and Scholarship Possession (%)

Characteristics by University Ranking X

When divided based on the presence in the top 10 university ranking, statistically significant differences were observed for the following variables:

- Time to Find a Job (months) (U Mann-Whitney p-value = 0.013)
- Finding a Job in Less Than 3 Months (chi-square p-value = 0.0026)

The time to find a job was significantly shorter for graduates from universities in the top 10 of ranking X. Finding a job within less than 3 months was twice as common for individuals studying at universities within this ranking compared to those outside of it.

Table 8. Descriptive Characteristics Stratified by University Ranking X

Variable	Parameter	University in the Top 10 in Ranking X	University Outside the Top 10 in Ranking X	test	p-value
Gender	Male	50,5% (N=49)	57,3% (N=59)	Chi-square	0,4136

Variable	Parameter	University in the Top 10 in Ranking X	University Outside the Top 10 in Ranking X	test	p-value
	Female	49,5% (N=48)	42,7% (N=44)		
Age	N	97	103	U Mann-Whitney	0,9873
	Mean (SD)	28,58 (3,97)	28,59 (4,03)		
	Median (IQR)	29 (25 - 32)	28 (25 - 32)		
	Range	22 - 35	22 - 35		
City	City 1	21,6% (N=21)	23,3% (N=24)	Chi-square	0,9765
	City 2	30,9% (N=30)	32% (N=33)		
	City 3	25,8% (N=25)	23,3% (N=24)		
	City 4	21,6% (N=21)	21,4% (N=22)		
Type of University	University	50,5% (N=49)	47,6% (N=49)	Chi-square	0,9106
	Polytechnic	29,9% (N=29)	31,1% (N=32)		
	Other	19,6% (N=19)	21,4% (N=22)		
Mode of Study	Full-time	62,9% (N=61)	63,1% (N=65)	Chi-square	0,9447
	Part-time	25,8% (N=25)	24,3% (N=25)		
	Evening	11,3% (N=11)	12,6% (N=13)		
Level	1	69,1% (N=67)	69,9% (N=72)	Chi-square	1
	2	30,9% (N=30)	30,1% (N=31)		

Variable	Parameter	University in the Top 10 in Ranking X	University Outside the Top 10 in Ranking X	test	p-value
Field of Study	Analytics	13,4% (N=13)	9,7% (N=10)	Chi-square	0,854
	Big Data	14,4% (N=14)	9,7% (N=10)		
	Econometrics	11,3% (N=11)	12,6% (N=13)		
	Economics	10,3% (N=10)	11,7% (N=12)		
	Data Science	15,5% (N=15)	17,5% (N=18)		
	Mathematics	13,4% (N=13)	18,4% (N=19)		
	Applied Mathematics	21,6% (N=21)	20,4% (N=21)		
RStudio	Yes	51,5% (N=50)	58,3% (N=60)	Chi-square	0,4176
	No	48,5% (N=47)	41,7% (N=43)		
Statistica	Yes	35,1% (N=34)	35,9% (N=37)	Chi-square	1
	No	64,9% (N=63)	64,1% (N=66)		
Python	Yes	52,6% (N=51)	50,5% (N=52)	Chi-square	0,8774
	No	47,4% (N=46)	49,5% (N=51)		
Matlab	Yes	37,1% (N=36)	35,9% (N=37)	Chi-square	0,9777
	No	62,9% (N=61)	64,1% (N=66)		

Variable	Parameter	University in the Top 10 in Ranking X	University Outside the Top 10 in Ranking X	test	p-value
Econometric Views	Yes	23,7% (N=23)	20,4% (N=21)	Chi-square	0,692
	No	76,3% (N=74)	79,6% (N=82)		
SPSS	Yes	33% (N=32)	33% (N=34)	Chi-square	1
	No	67% (N=65)	67% (N=69)		
Time to Find Employment (months)	N	97	103	U Mann-Whitney	**0,013**
	Mean (SD)	5,45 (3,86)	6,72 (3,5)		
	Median (IQR)	4 (2 - 9)	7 (4 - 10)		
	Range	0 - 12	0 - 12		
Finding a Job in Less Than 3 Months	Yes	43,3% (N=42)	22,3% (N=23)	Chi-square	**0,0026**
	No	56,7% (N=55)	77,7% (N=80)		
Industry	Market Research and Public Opinion	13,4% (N=13)	9,7% (N=10)	Chi-square	0,3038
	Analytics	10,3% (N=10)	21,4% (N=22)		
	Academic Career	13,4% (N=13)	8,7% (N=9)		
	Accounting	11,3% (N=11)	12,6% (N=13)		
	Banking	19,6% (N=19)	11,7% (N=12)		
	IT - Programming	7,2% (N=7)	9,7% (N=10)		
	IT - Data Engineering	12,4% (N=12)	15,5% (N=16)		
	Other	12,4% (N=12)	10,7% (N=11)		

Variable	Parameter	University in the Top 10 in Ranking X	University Outside the Top 10 in Ranking X	test	p-value
Satisfaction with Studies	1	8,2% (N=8)	12,6% (N=13)	Fisher	0,1002
	2	9,3% (N=9)	20,4% (N=21)		
	3	14,4% (N=14)	8,7% (N=9)		
	4	19,6% (N=19)	19,4% (N=20)		
	5	26,8% (N=26)	15,5% (N=16)		
	6	17,5% (N=17)	15,5% (N=16)		
	7	4,1% (N=4)	7,8% (N=8)		
Average GPA	N	97	103	U Mann-Whitney	0,1406
	Mean (SD)	4,12 (0,56)	4 (0,61)		
	Median (IQR)	4,2 (3,7 - 4,6)	4 (3,45 - 4,5)		
	Range	3 - 5	3 - 5		
Scholarship	Receiving Scholarship	24,7% (N=24)	18,4% (N=19)	Chi-square	0,3623
	No Scholarship	75,3% (N=73)	81,6% (N=84)		

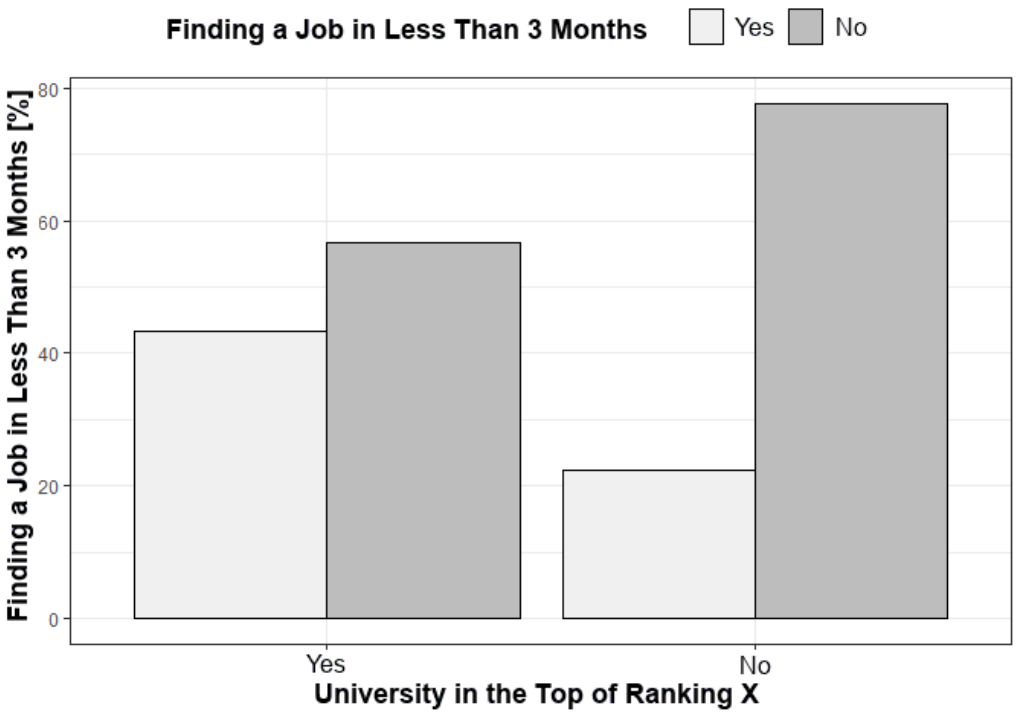

Figure 24. Relationship between the Number of People Who Found a Job in Less Than 3 Months and Universities in the Top 10 of Ranking X (%)

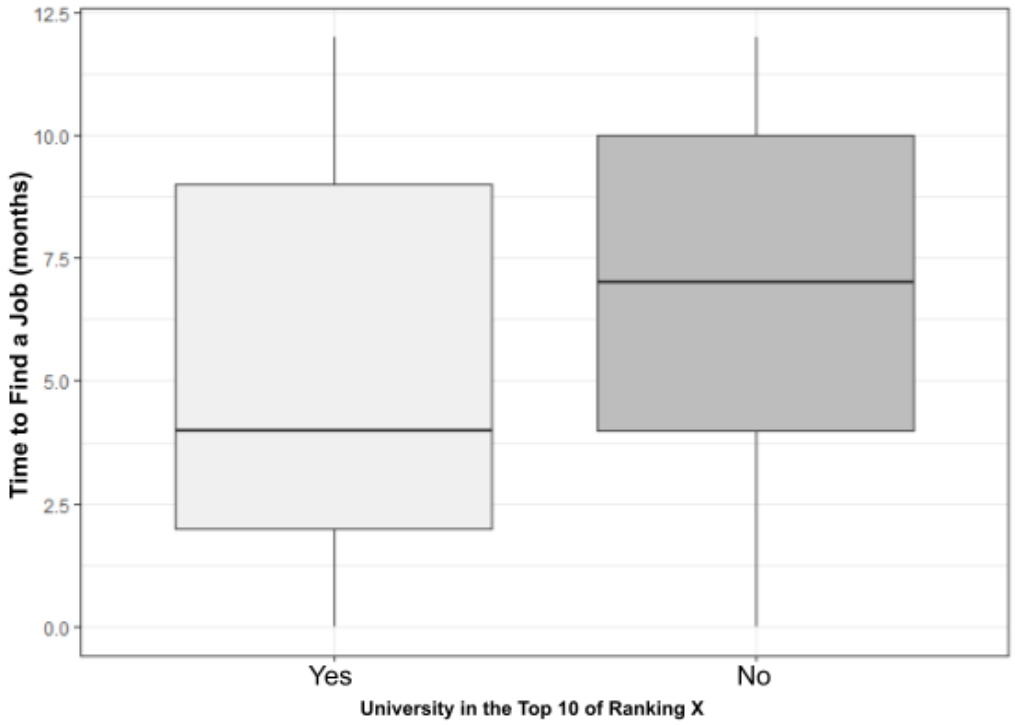

Figure 25. Relationship between Time to Find a Job (months) and Universities in the Top 10 of Ranking X (%)

Percentage Tests

The test for comparing the percentages of individuals who found a job in less than 3 months based on the presence of the student's university in the top 10 of Ranking X showed statistically significant differences (p-value = 0.0026). Individuals studying at universities included in the aforementioned ranking were almost twice as likely to find a job within a period of less than 3 months compared to individuals studying at universities outside of the ranking.

Table 9. Results for Finding a Job in Less Than 3 Months based on the Presence of the Student's University in the Top 10 of Ranking X

Variable	Number of Cases for Individuals from Universities in the Top 10 of Ranking X	Number of Cases for Individuals from Universities Outside the Top 10 of Ranking X	Number of Individuals from Universities in the Top 10 of Ranking X	Total Number of Individuals from Universities Outside the Top 10 of Ranking X	Percentage of Individuals from Universities in the Top 10 of Ranking X [%]	Percentage of Individuals from Universities Outside the Top 10 of Ranking X [%]	Statistics	p-value
Finding a Job in Less Than 3 Months	42	23	97	103	43,3	22,3	9,0795	**0,0026**

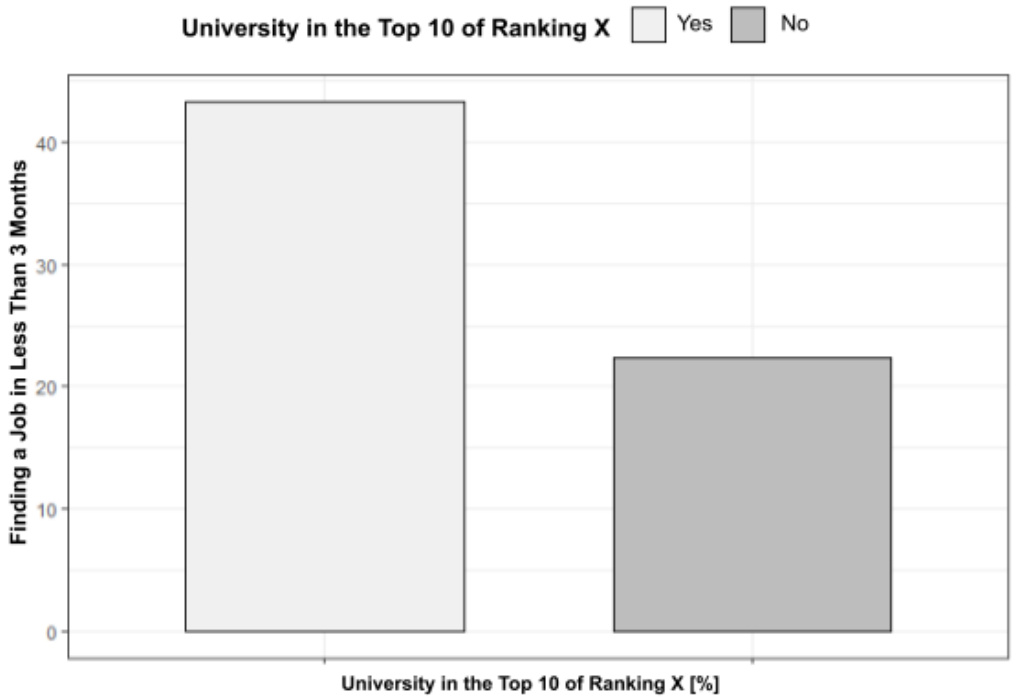

Figure 26. Percentages of Individuals Who Found a Job in Less Than 3 Months based on the Presence of the Student's University in the Top 10 of Ranking X

Phi Coefficients

For the variables "Applied Mathematics" with the field "Agriculture" and "Economics" with the field "IT Programming," there is no dependence | Φ | = 0. The remaining variables exhibit weak dependence | Φ | < 0.2. The highest positive dependence is observed between the variables "Data Engineering and Analysis" with the field "Market Research and Public Opinion" Φ = 0.16, and negative dependence among the variables "Analyst" with the field "Market Research and Public Opinion" Φ = -0.16.

Table 10. Phi Coefficients for Variables: Field of Study and Industry

Variable 1	Variable 2	Phi Coefficients
Economics	Market Research and Public Opinion	0,12
Economics	Analytics	0,10
Economics	Academic Career	-0,13
Economics	Accounting	-0,04
Economics	IT - Data Engineering	-0,06
Economics	Banking	0,02
Economics	IT - Programming	0,00
Economics	Other	-0,03
Big Data	Market Research and Public Opinion	0,01
Big Data	Analytics	-0,12
Big Data	Academic Career	0,02
Big Data	Accounting	0,05
Big Data	IT - Data Engineering	0,03
Big Data	Banking	-0,03
Big Data	IT - Programming	0,05
Big Data	Other	0,01
Data Science	Market Research and Public Opinion	0,16
Data Science	Analytics	0,05
Data Science	Academic Career	0,07
Data Science	Accounting	-0,09

Variable 1	Variable 2	Phi Coefficients
Data Science	IT - Data Engineering	-0,06
Data Science	Banking	-0,03
Data Science	IT - Programming	-0,06
Data Science	Other	-0,04
Mathematics	Market Research and Public Opinion	-0,03
Mathematics	Analytics	-0,11
Mathematics	Academic Career	0,03
Mathematics	Accounting	0,07
Mathematics	IT - Data Engineering	-0,05
Mathematics	Banking	0,03
Mathematics	IT - Programming	-0,05
Mathematics	Other	0,12
Applied Mathematics	Market Research and Public Opinion	-0,03
Applied Mathematics	Analytics	0,03
Applied Mathematics	Academic Career	-0,11
Applied Mathematics	Accounting	0,08
Applied Mathematics	IT - Data Engineering	-0,10
Applied Mathematics	Banking	0,00
Applied Mathematics	IT - Programming	0,11
Applied Mathematics	Other	0,05
Analytics	Market Research and Public Opinion	-0,16
Analytics	Analytics	0,11
Analytics	Academic Career	0,06
Analytics	Accounting	-0,04
Analytics	IT - Data Engineering	0,10
Analytics	Banking	-0,04
Analytics	IT - Programming	0,01
Analytics	Other	-0,07
Econometrics	Market Research and Public Opinion	-0,03

Variable 1	Variable 2	Phi Coefficients
Econometrics	Analytics	-0,06
Econometrics	Academic Career	0,05
Econometrics	Accounting	-0,04
Econometrics	IT - Data Engineering	0,11
Econometrics	Banking	0,05
Econometrics	IT - Programming	-0,07
Econometrics	Other	-0,03
Market Research and Public Opinion	Economics	0,12
Market Research and Public Opinion	Big Data	0,01
Market Research and Public Opinion	Data Science	0,16
Market Research and Public Opinion	Mathematics	-0,03
Market Research and Public Opinion	Applied Mathematics	-0,03
Market Research and Public Opinion	Analytics	-0,16
Market Research and Public Opinion	Econometrics	-0,03
Analytics	Economics	0,10
Analytics	Big Data	-0,12
Analytics	Data Science	0,05
Analytics	Mathematics	-0,11
Analytics	Applied Mathematics	0,03
Analytics	Analytics	0,11
Analytics	Econometrics	-0,06
Academic Career	Economics	-0,13
Academic Career	Big Data	0,02
Academic Career	Data Science	0,07
Academic Career	Mathematics	0,03
Academic Career	Applied Mathematics	-0,11
Academic Career	Analytics	0,06
Academic Career	Econometrics	0,05
Accounting	Economics	-0,04

Variable 1	Variable 2	Phi Coefficients
Accounting	Big Data	0,05
Accounting	Data Science	-0,09
Accounting	Mathematics	0,07
Accounting	Applied Mathematics	0,08
Accounting	Analytics	-0,04
Accounting	Econometrics	-0,04
IT - Data Engineering	Economics	-0,06
IT - Data Engineering	Big Data	0,03
IT - Data Engineering	Data Science	-0,06
IT - Data Engineering	Mathematics	-0,05
IT - Data Engineering	Applied Mathematics	-0,10
IT - Data Engineering	Analytics	0,10
IT - Data Engineering	Econometrics	0,11
Banking	Economics	0,02
Banking	Big Data	-0,03
Banking	Data Science	-0,03
Banking	Mathematics	0,03
Banking	Applied Mathematics	0,00
Banking	Analytics	-0,04
Banking	Econometrics	0,05
IT - Programming	Economics	0,00
IT - Programming	Big Data	0,05
IT - Programming	Data Science	-0,06
IT - Programming	Mathematics	-0,05
IT - Programming	Applied Mathematics	0,11
IT - Programming	Analytics	0,01
IT - Programming	Econometrics	-0,07
Other	Economics	-0,03
Other	Big Data	0,01

Variable 1	Variable 2	Phi Coefficients
Other	Data Science	-0,04
Other	Mathematics	0,12
Other	Applied Mathematics	0,05
Other	Analytics	-0,07
Other	Econometrics	-0,03

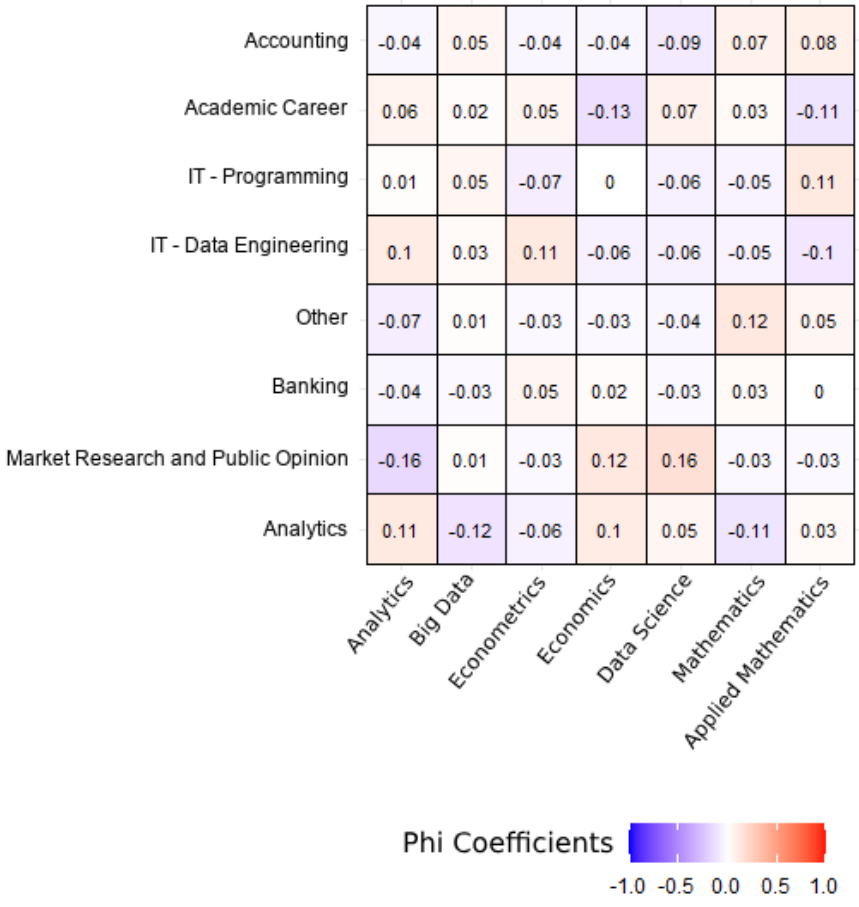

Figure 27. Heatmap for Phi Coefficients between Major and Industry

Multifactor Correspondence Analysis

In Table 11, Table 12, and Table 13, the frequencies of category pairs for variables "University Type" and "Major," "University Type" and "Industry," respectively, are presented. The most frequently occurring pair in the population for the "Industry" and "Major"

variables was "IT Data Engineer" and "Applied Mathematics" (9 cases). For the "University Type" and "Major" variables, the most common pairing was "Polytechnic" and "Applied Mathematics" (35 cases). Regarding the "University Type" and "Industry" variables, the most frequent combination was "University" and "Analyst," with a count of 16.

Table 11. Contingency between the "Industry" and "Field of Study" Variables

	Analytics	Big Data	Econometrics	Economics	Data Science	Mathematics	Applied Mathematics
Analytics	6	5	1	1	6	8	5
Market Research and Public Opinion	5	6	3	2	3	0	4
Banking	4	3	3	4	5	4	8
Other	2	2	3	5	5	2	4
IT - Data Engineering	2	2	4	2	2	7	**9**
IT - Programming	2	1	3	1	5	3	2
Academic Career	0	4	3	3	1	5	6
Accounting	2	1	4	4	6	3	4

Table 12. Contingency between the "Type of University" and "Field of Study" Variable

	Analytics	Big Data	Econometrics	Economics	Data Science	Mathematics	Applied Mathematics
Other	9	4	6	2	7	6	7
Polytechnic	0	0	0	0	26	0	**35**
University	14	20	18	20	0	26	0

Table 13. Contingency between the "Type of University" and "Industry" Variables

	Analytics	Market Research and Public Opinion	Banking	Other	IT - Data Engineering	IT - Programming	Academic Career	Księgowość
Other	7	7	8	5	3	7	3	1
Polytechnic	9	4	11	7	11	4	6	9
University	**16**	12	12	11	14	6	13	14

In Table 14, eigenvalues are summarized. Three dimensions, 1, 2, and 3, are sufficient to retain 47.5% of the total variance in the data. This percentage is depicted in Figure 28.

Table 14. Correspondence Analysis - Summary of Eigenvalues

	Eigenvalues	Percentage of Variance	Cumulative Percentage of Variance
Dimension 1	**0,214**	21,35	**21,4**
Dimension 2	**0,144**	14,36	**35,7**
Dimension 3	**0,118**	11,81	**47,5**
Dimension 4	0,114	11,35	58,9
Dimension 5	0,104	10,43	69,3
Dimension 6	0,088	8,76	78,1
Dimension 7	0,079	7,87	85,9
Dimension 8	0,073	7,29	93,2
Dimension 9	0,068	6,79	100,0

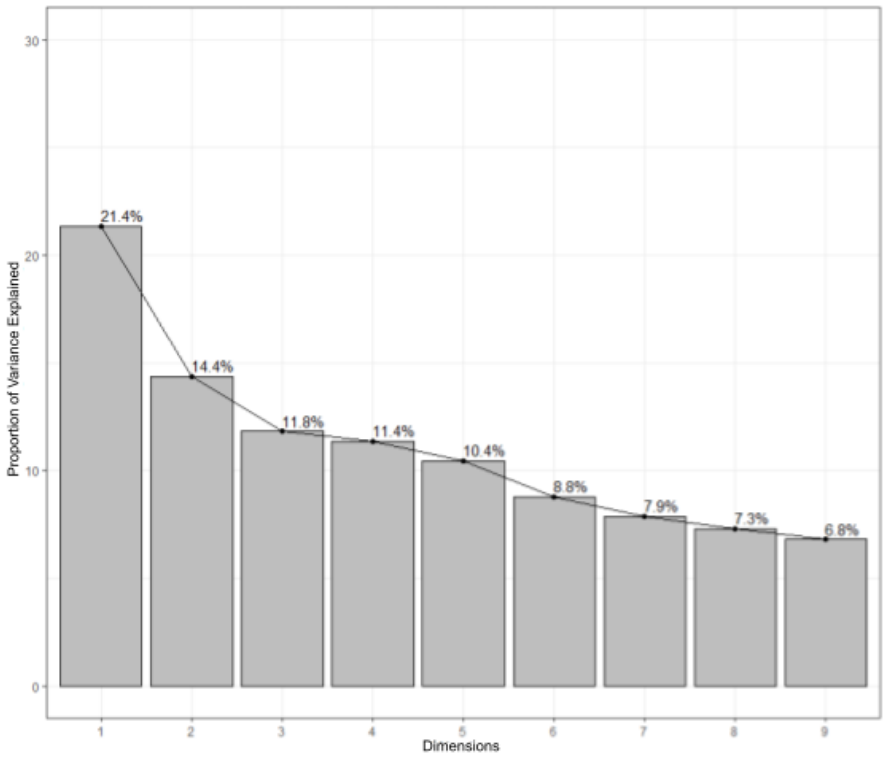

Figure 28. Percentage of variance for individual dimensions

Analysis with respect to dimensions 1 and 2

Individuals and Variable Categories

The following chart presents the overall pattern in the data with respect to dimensions 1 and 2. The first two dimensions capture 35.7% of the total variance in the data. Individuals are represented by blue points, and variable categories by red triangles. Points that are farther from the center of the coordinate system have a stronger association with the respective dimension. Therefore, variable categories such as "Finding a job in less than 3 months_Yes," "Top 10 university in Ranking X_Yes," "Finding a job in less than 3 months_No," and "Top 10 university in Ranking X_No" have the most influence on dimension 2. On the other hand, variables "Python_Yes," "Matlab_Yes," "Statistica_Yes," and "Python_No" are significantly associated with dimension 1. The distance between any points representing individuals or variable categories measures their similarity. Categories "R_studio_Yes" and "Statistica_No," as well as "R_studio_No" and "Statistica_Yes," are located close to each other on the chart, indicating a higher similarity between them compared to the other categories.

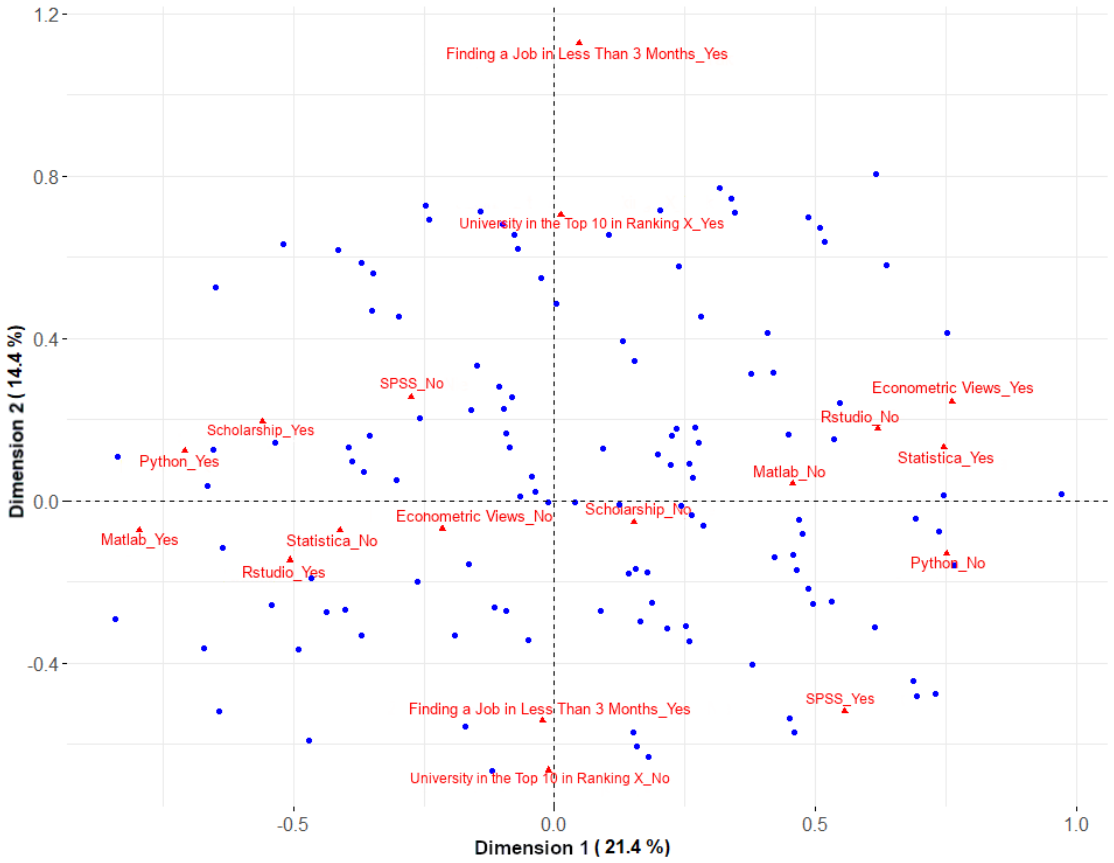

Figure 29. Plot of individuals and variable categories

Correlation between Variables and the Main Dimensions

The chart in Figure 30 helps identify the variables that are most correlated with each dimension. It can be observed that variables "Python," "Matlab," and "RStudio" are most strongly correlated with dimension 1, while variables "Top 10 university in Ranking X" and "Finding a job in less than 3 months" are most correlated with dimension 2. The variable "SPSS" is moderately correlated with both dimension 1 and 2.

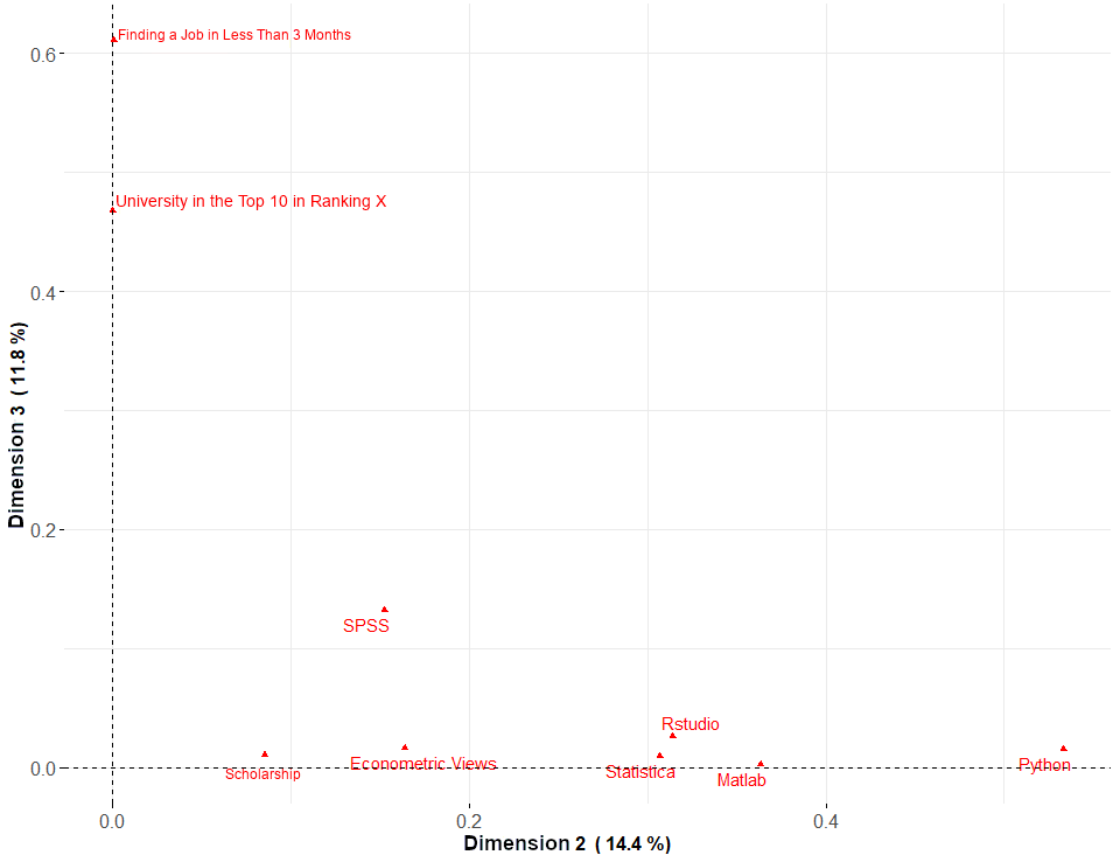

Figure 30. Correlation between variables and the main dimensions

Quality of Representation of Variable Categories

Figure 31 presents the factor map of dimensions 1 and 2, taking into account the quality of representation of variable categories (cos2) using appropriate color coding. Categories such as "Scholarship_Yes" and "Scholarship_No" exhibit the lowest quality, while categories "Finding a job in less than 3 months_Yes" and "Finding a job in less than 3 months_No" show the highest quality values. These relationships are also depicted in Figure 32 in the form of a bar chart.

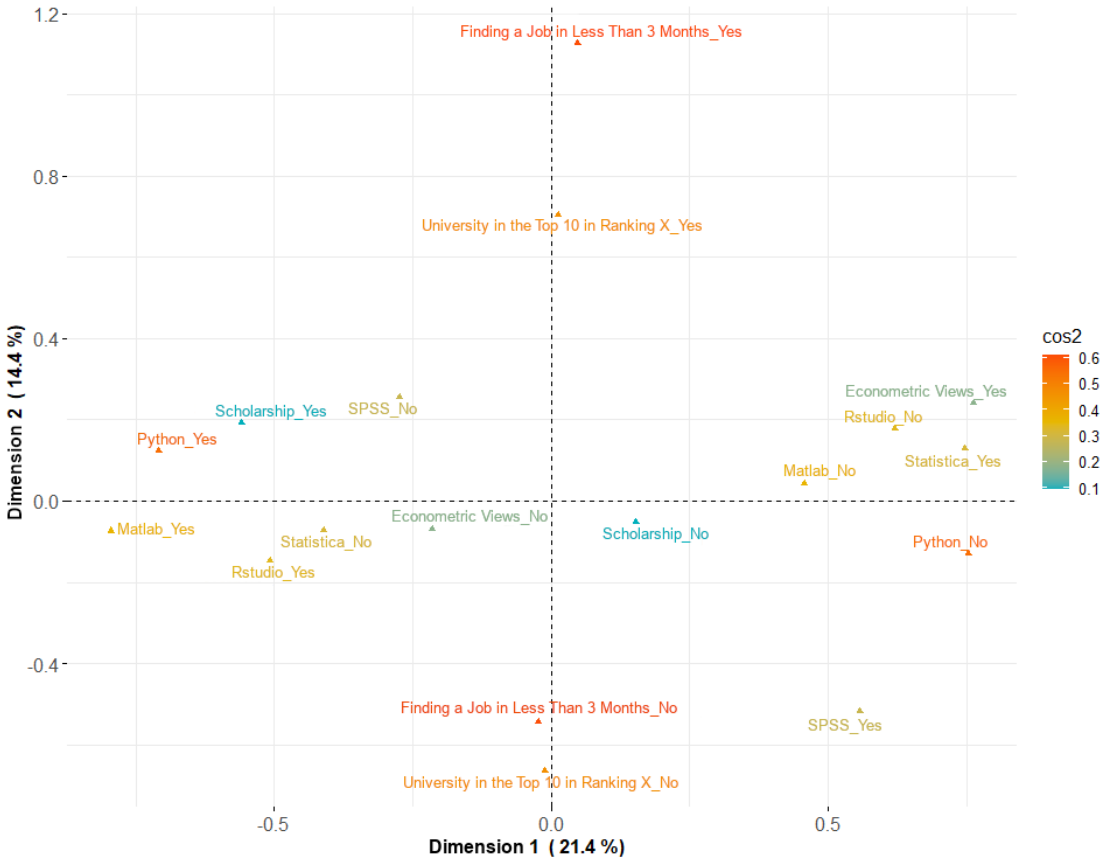

Figure 31. Quality of representation of variable categories

Cos2 - Quality of Representation of Variable Categories

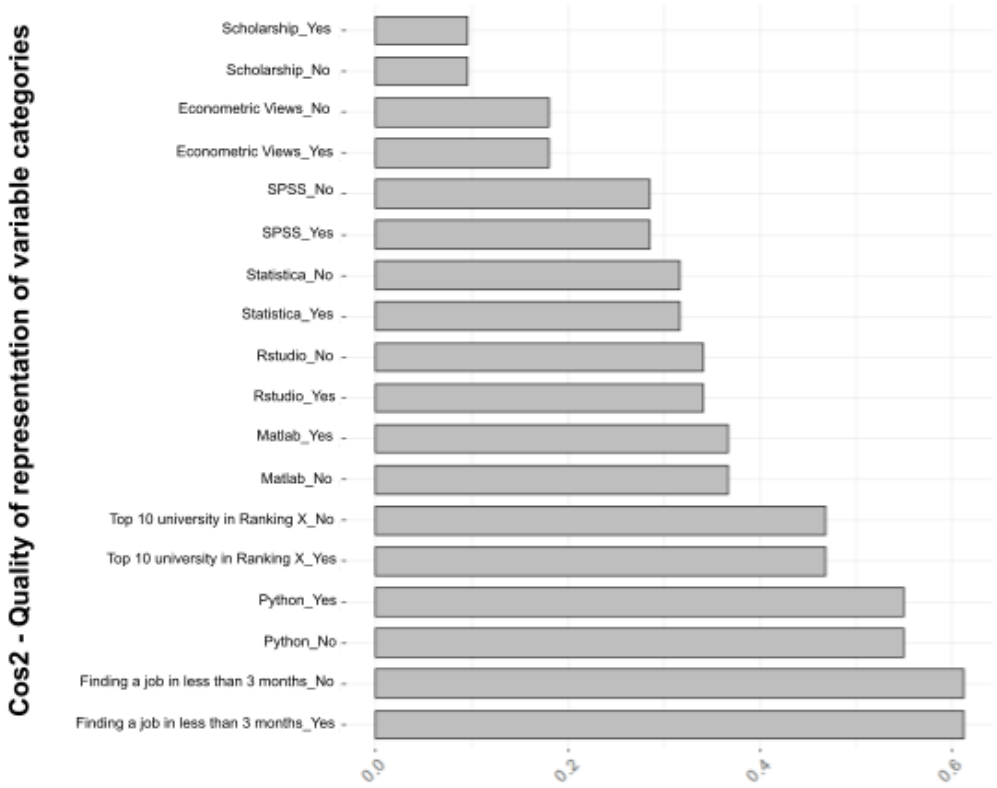

Figure 32. Cos2 - Quality of representation of variable categories for the sum of dimensions 1 and 2

Contributions of Variable Categories

Figures 33 and 34 present the contributions of variable categories to dimension 1 and 2, respectively. Variable categories "Python_No" and "Python_Yes" have the largest contribution to dimension 1, while the categories "Top 10 university in Ranking X_No" and "Top 10 university in Ranking X_Yes" have the smallest contribution. For dimension 2, the most significant categories are "Finding a job in less than 3 months" and "Top 10 university in Ranking X_Yes," while the variables "Matlab_No" and "Matlab_Yes" have the smallest contribution. These relationships are visualized in Figure 35, where colors represent the degree of contribution. If these variables have a significant contribution to the creation of a dimension, they are closer to the axis of that dimension; however, if their contribution is small, they are further away from the axis of that dimension.

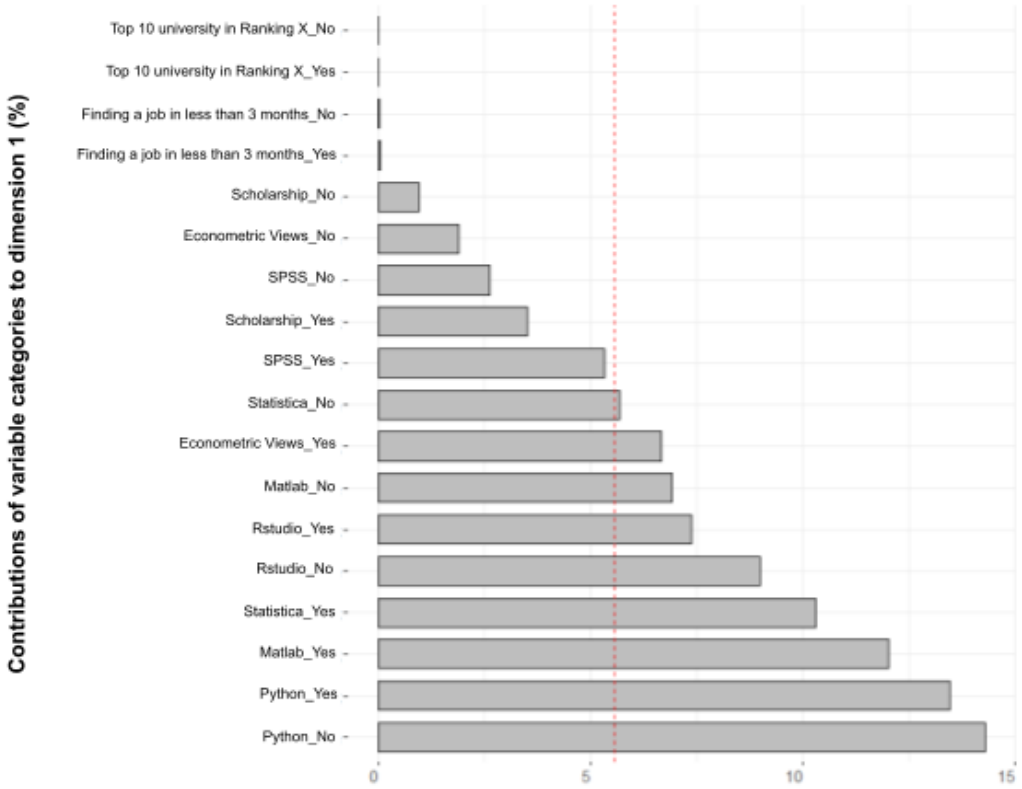

Figure 33. Contributions of variable categories to dimension 1

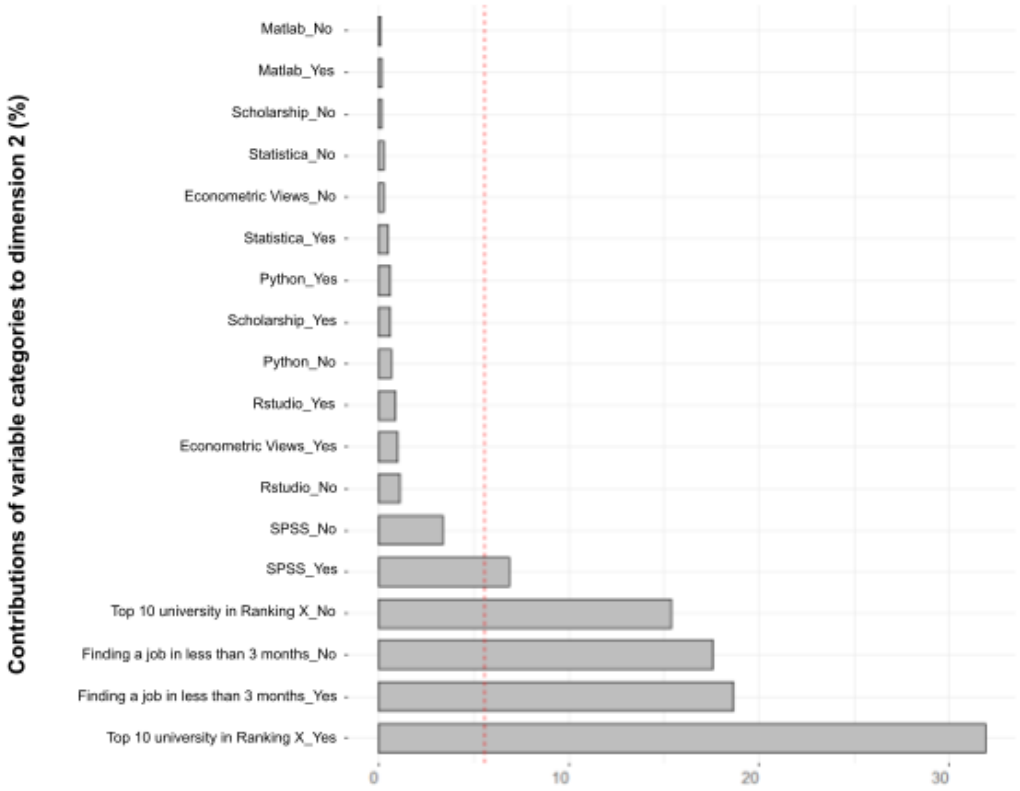

Figure 34. Contributions of variable categories to dimension 2

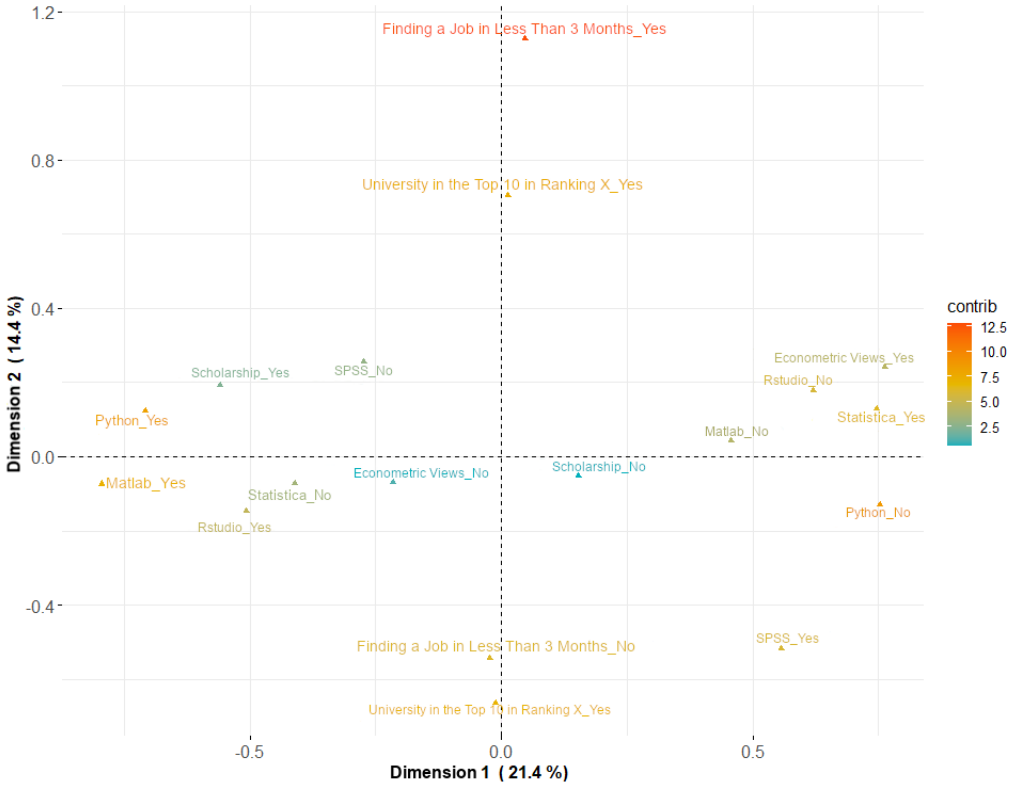

Figure 35. Contributions of variable categories to dimensions 1 and 2

Grouping Individuals

In Figure 38, four plots featuring variables with the highest contributions from dimensions 1 and 2 are presented. Individuals representing each category are depicted in the same color. Clearly visible clusters in the population are enclosed by concentration ellipses. Ellipses for the variable categories "Top 10 university in Ranking X" and "Finding a job in less than 3 months" strongly overlap, similarly, the variable "Python" is closely associated with the variable "Matlab."

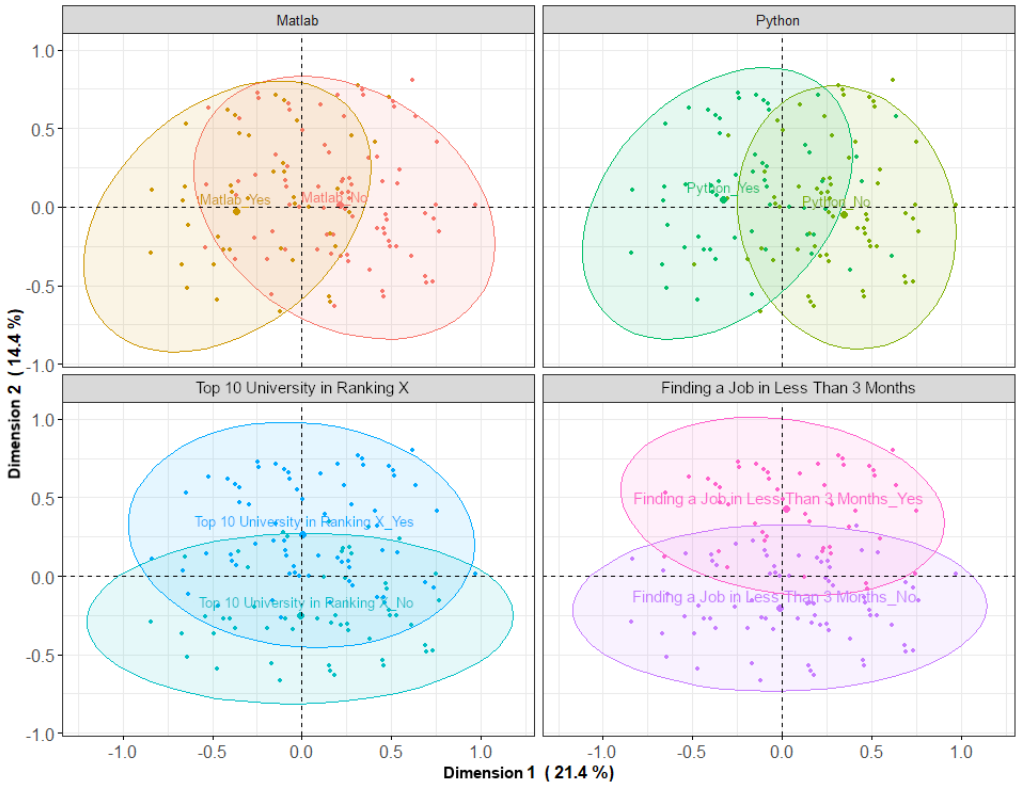

Figure 36. Individuals by groups using levels of variables: "Matlab," "Python," "Top 10 university in Ranking X," "Finding a job in less than 3 months."

Filtering - 5 Individuals and Variable Categories with the Highest Contributions

Figure 39 depicts 5 individuals and 5 variables with the highest contributions to dimensions 1 and 2.

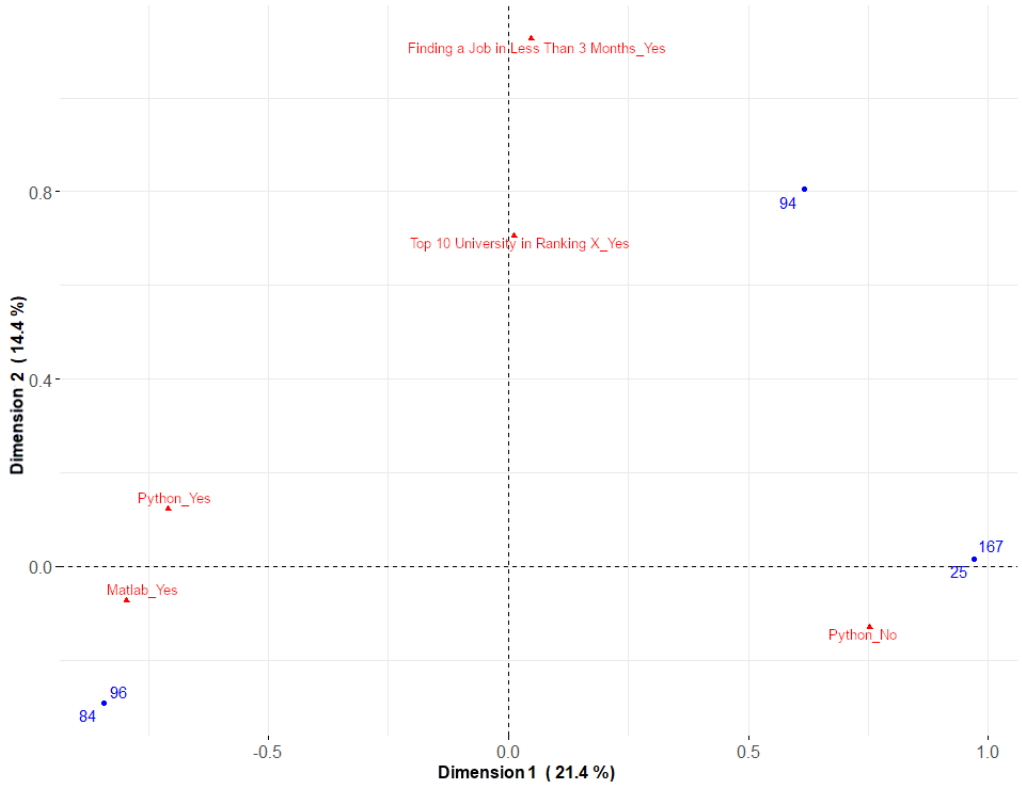

Figure 37. 5 individuals and variable categories with the highest contributions

Analysis with respect to dimensions 1 and 3

Individuals and Category Variables

The chart below presents the overall pattern in the data with respect to dimensions 1 and 3. They capture 33.16% of the total variance in the data. Points that are farther from the center of the coordinate system have a stronger association with the respective dimension. Therefore, variable categories such as "Matlab_Yes," "Python_Yes," "RStudio_Yes," "RStudio_No," "Python_No," and "Matlab_No" have the most influence on dimension 1. On the other hand, variables "Scholarship_Yes," "Scholarship_No," "SPSS_Yes," and "SPSS_No" are significantly associated with dimension 3. Categories "RStudio_No" and "Matlab_No," as well as "Matlab_Yes" and "Python_Yes," are located close to each other on the chart, indicating a higher similarity between them compared to the other categories.

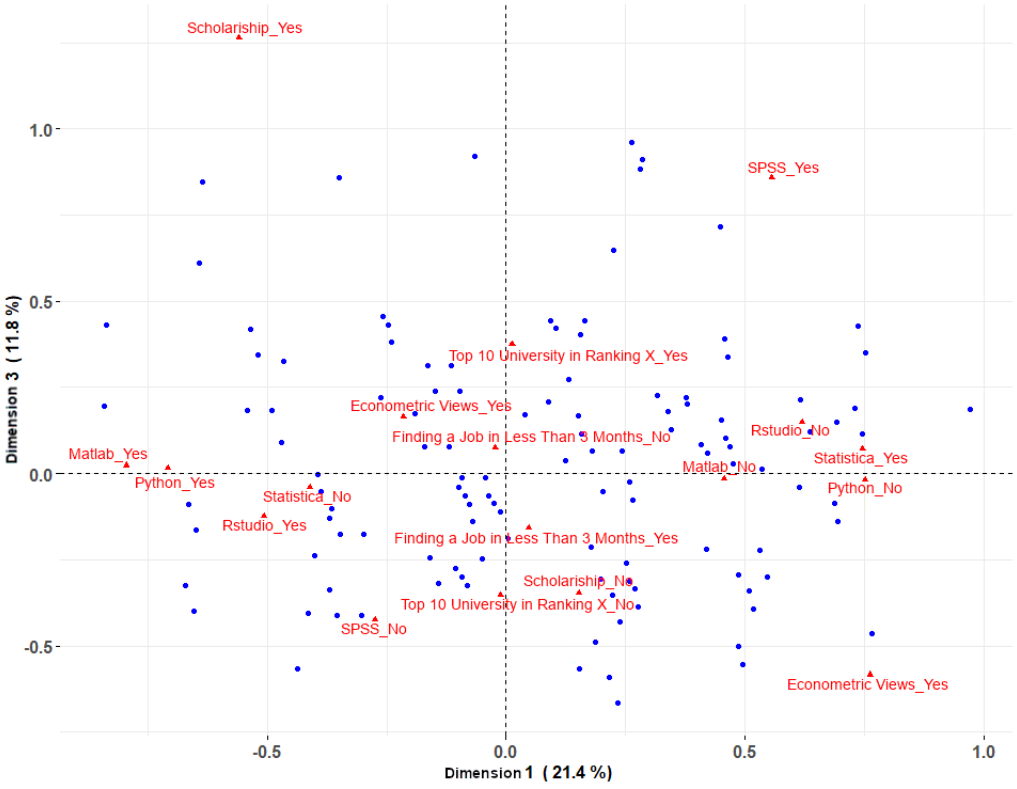

Figure 38. Plot of individuals and variable categories

Correlation between Variables and Principal Dimensions

In Figure 41, it can be observed that variables "Python," "Matlab," and "RStudio" are most strongly correlated with dimension 1, while variables "Top 10 university in Ranking X" and "Finding a job in less than 3 months" are most correlated with dimension 3. The variable "SPSS" is moderately correlated with both dimension 1 and 3.

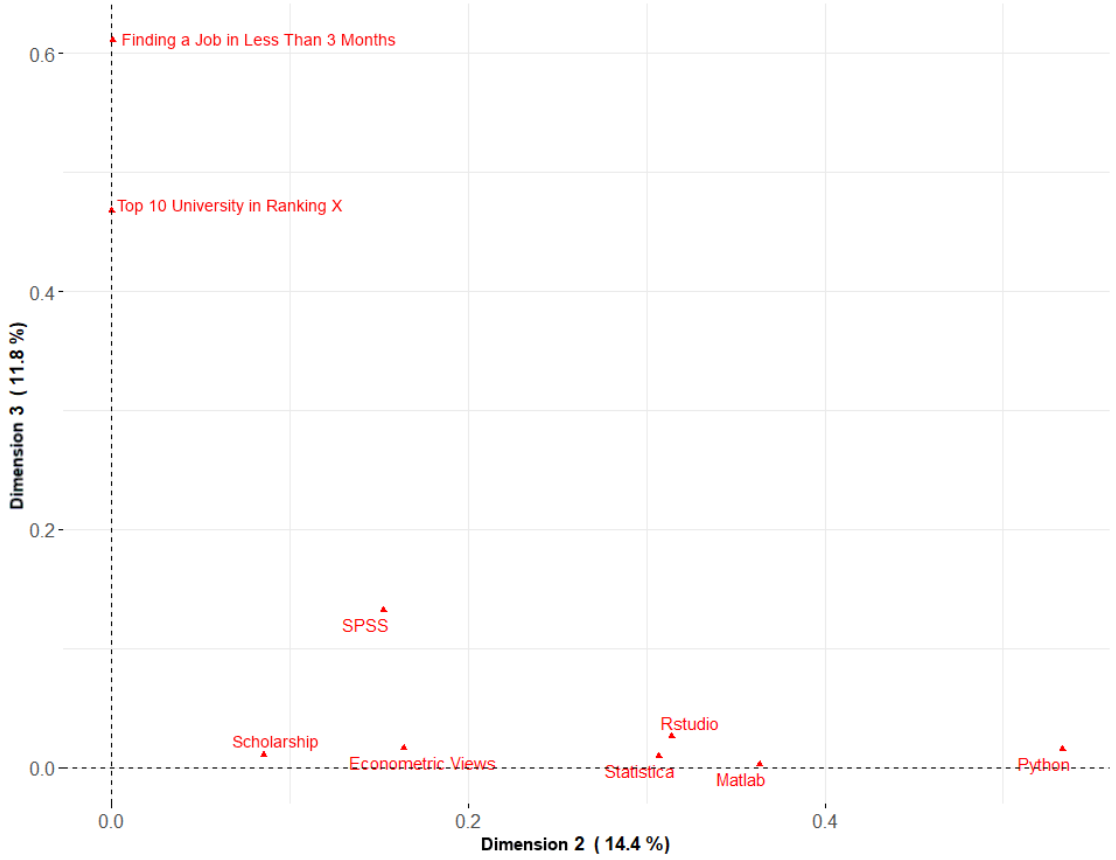

Figure 39. Correlation between variables and the main dimensions

Quality of Category Variables Representation

In Figure 40, a factor map of dimensions 1 and 3 is presented, taking into account the quality of representation of variable categories (cos2) using appropriate color coding. Categories such as "Finding a job in less than 3 months_Yes" and "Finding a job in less than 3 months_No" exhibit the lowest quality, while categories "Python_Yes" and "Python_No" show the highest quality values. These relationships are also depicted in Figure 41 in the form of a bar chart.

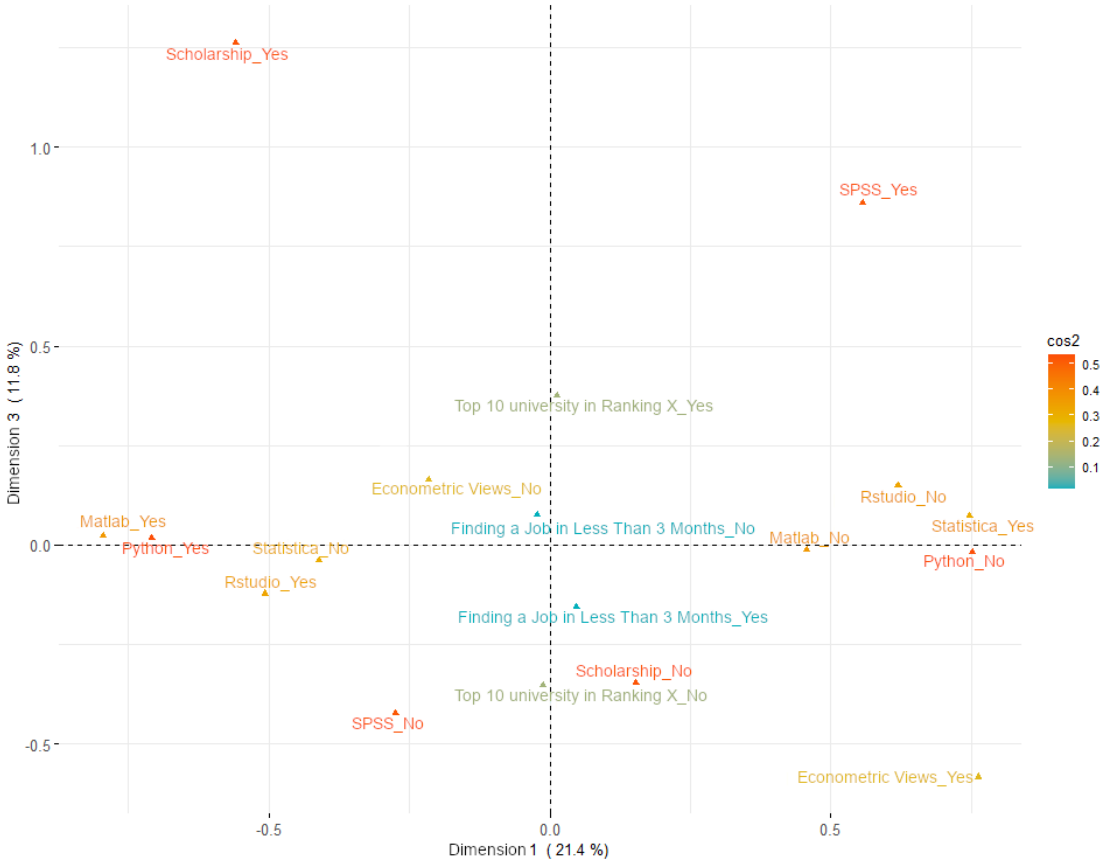

Figure 40. Quality of representation of variable categories

Cos2 - Quality of Category Variables Representation

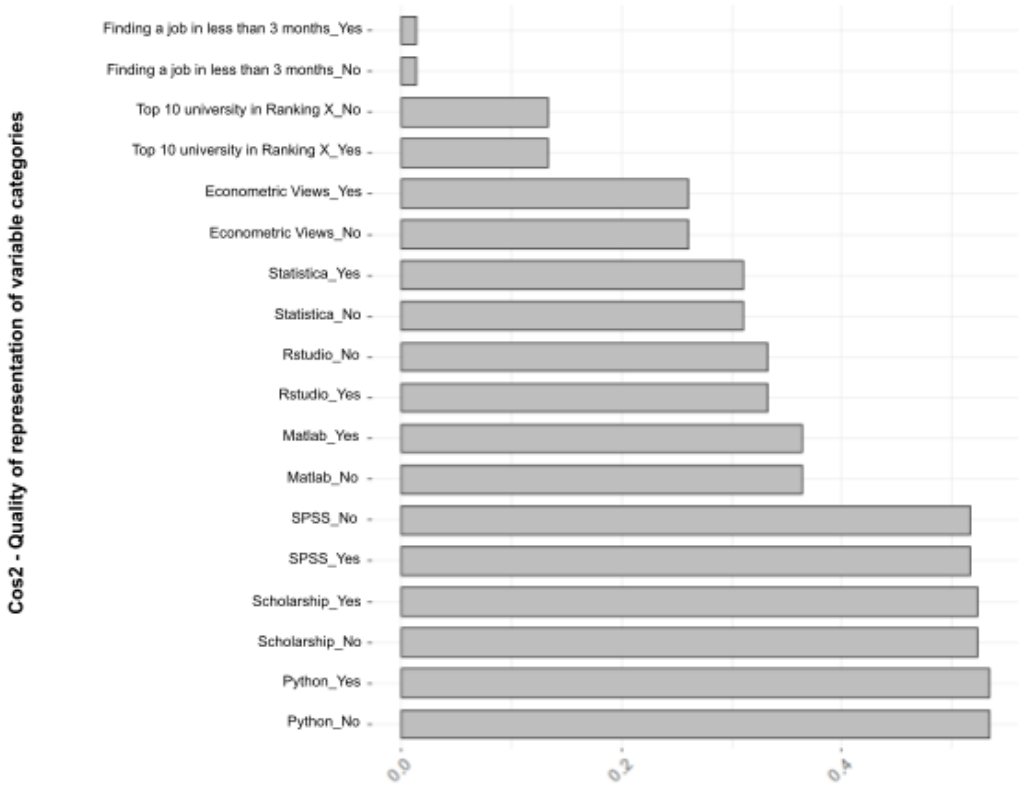

Figure 41. Cos2 - Quality of representation of variable categories for the sum of dimensions 1 and 3

Category Variable Contributions

Figure 40 presents the contributions of variable categories to dimension 3. Variable categories "Scholarship_Yes" and "SPSS_Yes" have the largest contribution to dimension 3, while the categories "Matlab_No" and "Python_Yes" have the smallest contribution. These relationships are visualized in Figure 46, with colors indicating the degree of contribution.

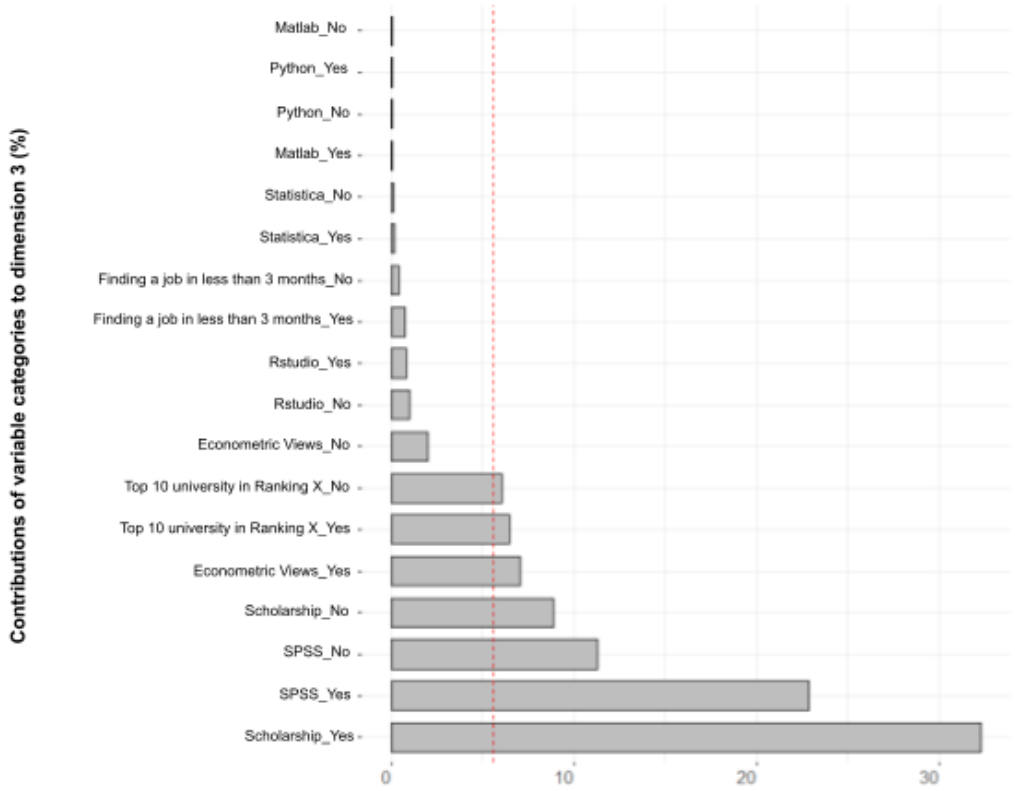

Figure 42. Contributions of variable categories to dimension 3

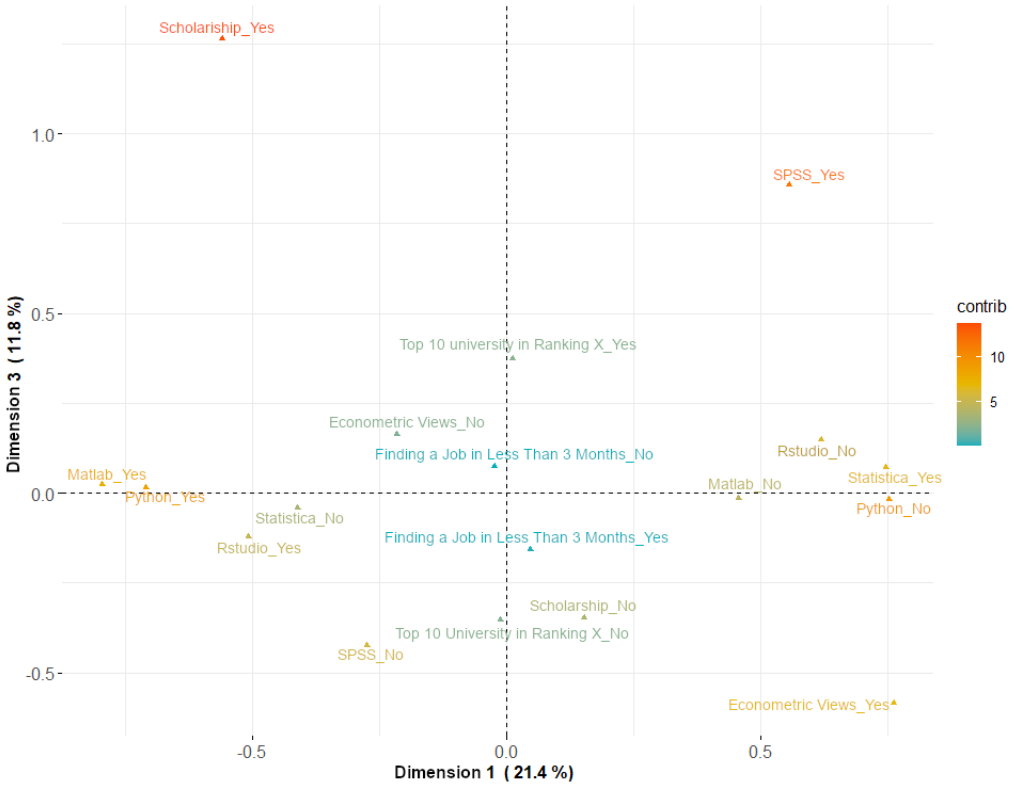

Figure 43. Contributions of variable categories to dimensions 1 and 3

Grouping of Individuals

Figure 46 displays four plots of variables with the highest contributions from dimensions 1 and 3. Individuals representing each category are depicted in the same color. Clear clusters in the population are enclosed by concentration ellipses. The ellipses for the variables "Matlab" and "Python" are similar, indicating that these variables are closely associated with each other.

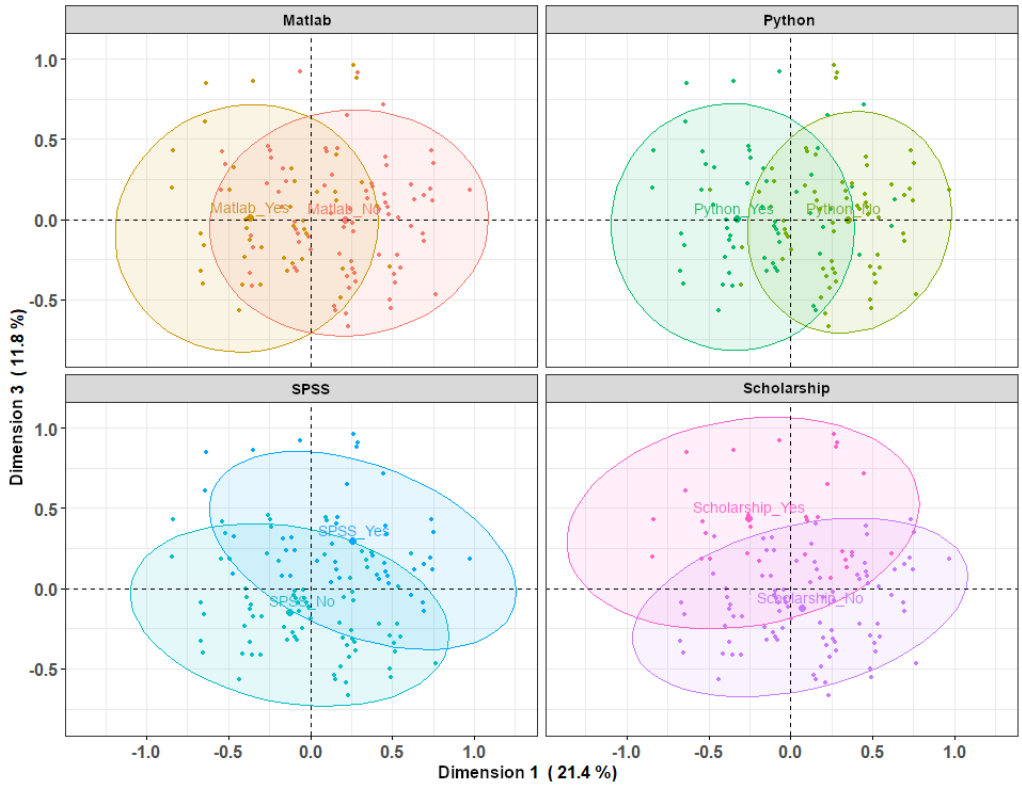

Figure 44. Individuals by groups using levels of variables: "Matlab," "Python," "Scholarship," "SPSS."

Filtering - 5 individuals and variable categories with the highest contributions

Figure 47 depicts 5 individuals and 5 variables with the highest contributions to dimensions 2 and 3.

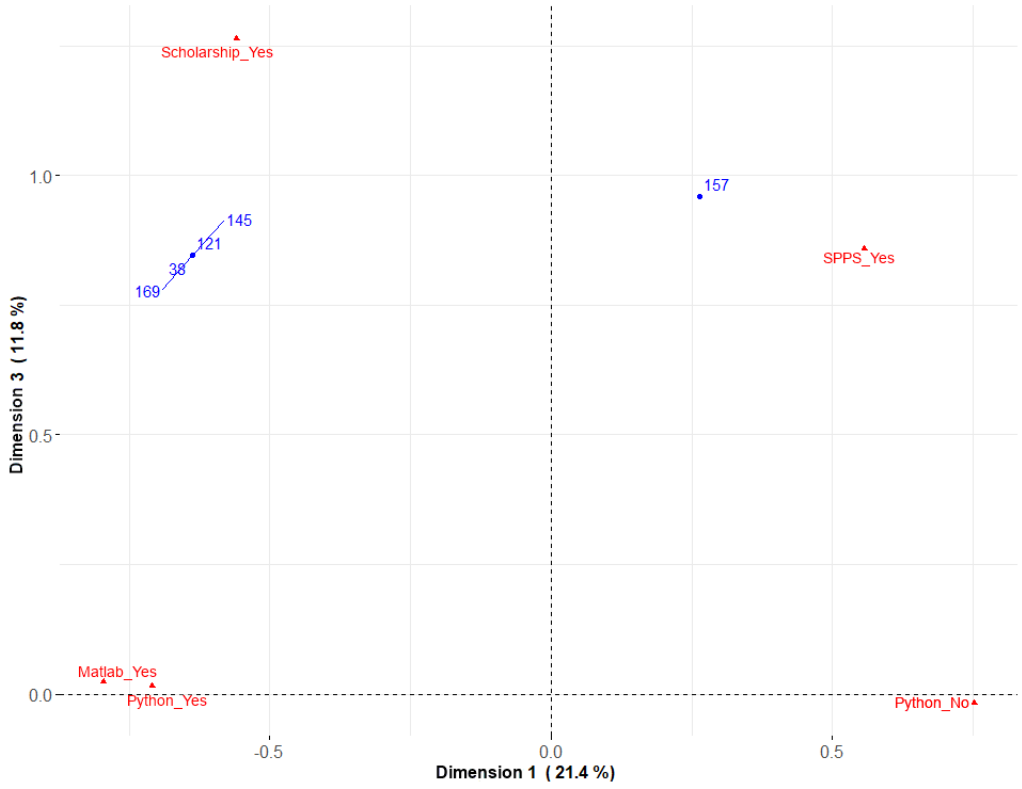

Figure 45. 5 individuals and variable categories with the highest contributions

Analysis with Respect to Dimensions 2 and 3

Individuals and Category Variables

The chart below presents the overall pattern in the data with respect to dimensions 2 and 3. These dimensions capture 26.17% of the total variance in the data. Points that are farther from the center of the coordinate system have a stronger association with the respective dimension. Variable categories most strongly associated with dimension 2 are mentioned in the description of Figure 27, and those most strongly associated with dimension 3 are mentioned in the description of Figure 40. Categories at the center of the chart are close to each other, indicating a higher degree of similarity between them compared to the other categories.

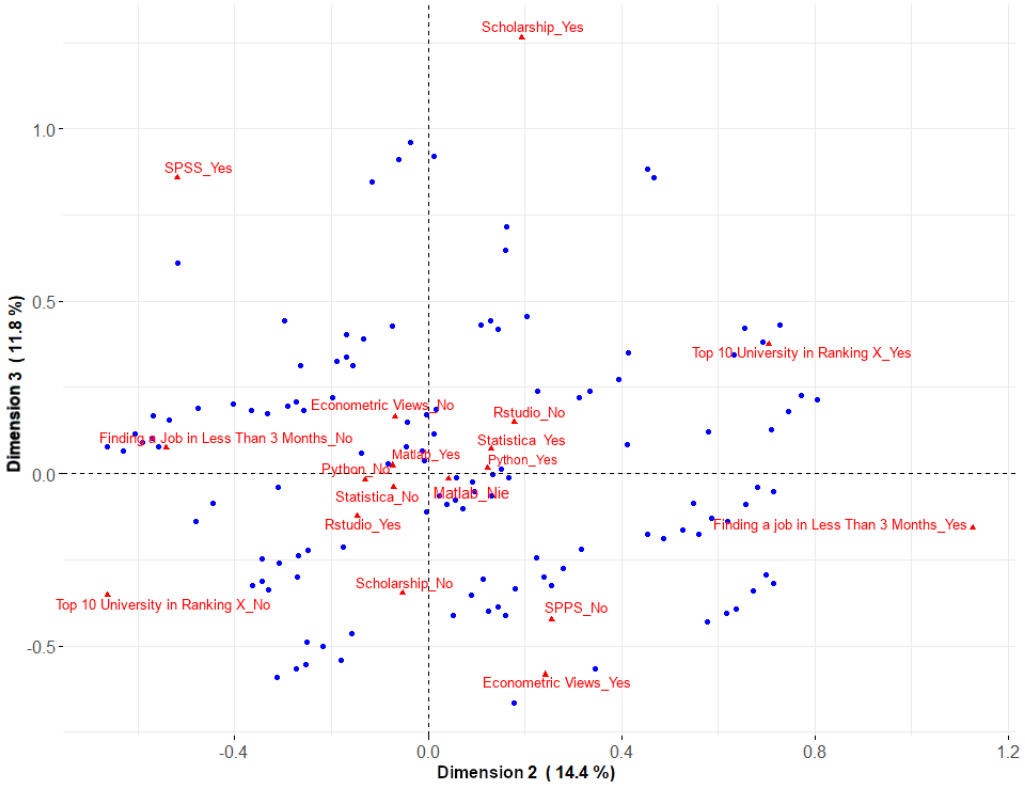

Figure 46. Plot of individuals and variable categories

Correlation between Variables and Principal Dimensions

In Figure 49, it can be observed that variables "Python," "Matlab," "RStudio," "Econometric Views," and "Scholarship" are most strongly correlated with dimension 2, while variables "NO" and "_Y" are most correlated with dimension 3. The variable "SPSS" is moderately correlated with both dimension 2 and 3.

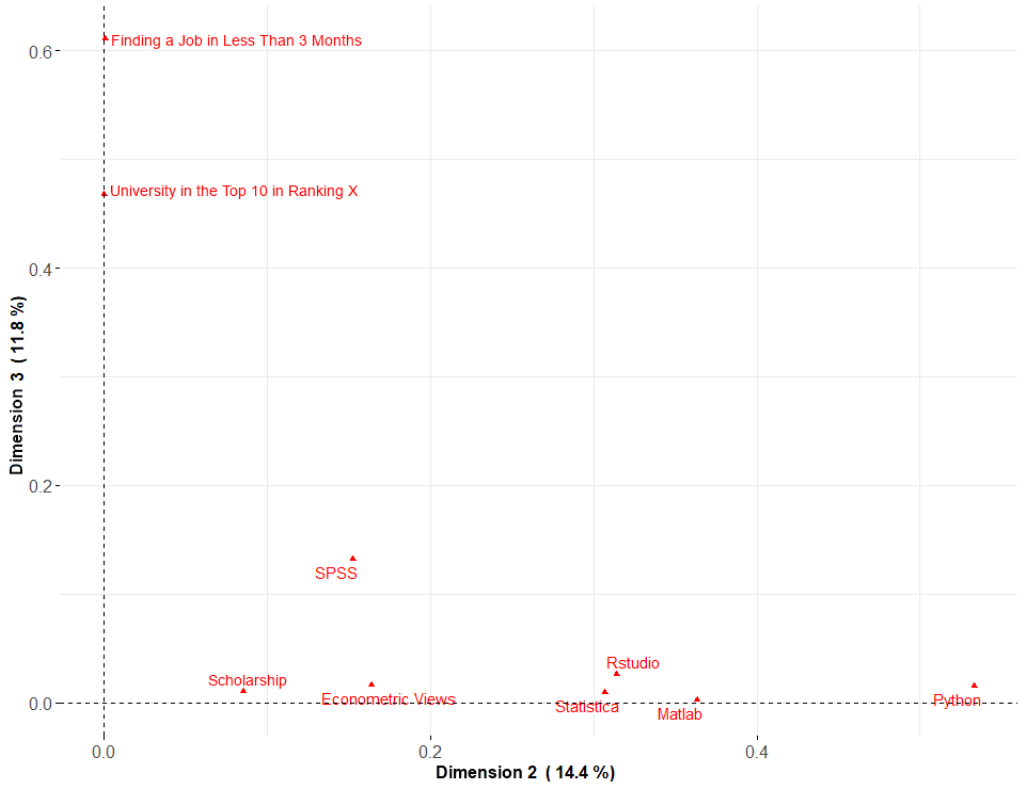

Figure 47. Correlation between variables and the main dimensions

Quality of Category Variables Representation

In Figure 50, a factor map of dimensions 2 and 3 is presented, taking into account the quality of representation of variable categories (cos2) using appropriate color coding. Categories such as "Finding a job in less than 3 months_Yes" and "Finding a job in less than 3 months_No" exhibit the highest quality, while categories "Matlab_Yes" and "Matlab_No" show the lowest quality values. These relationships are also depicted in Figure 51 in the form of a bar chart.

Figure 48. Quality of representation of variable categories

Cos2 - Quality of Representation of Variable Categories

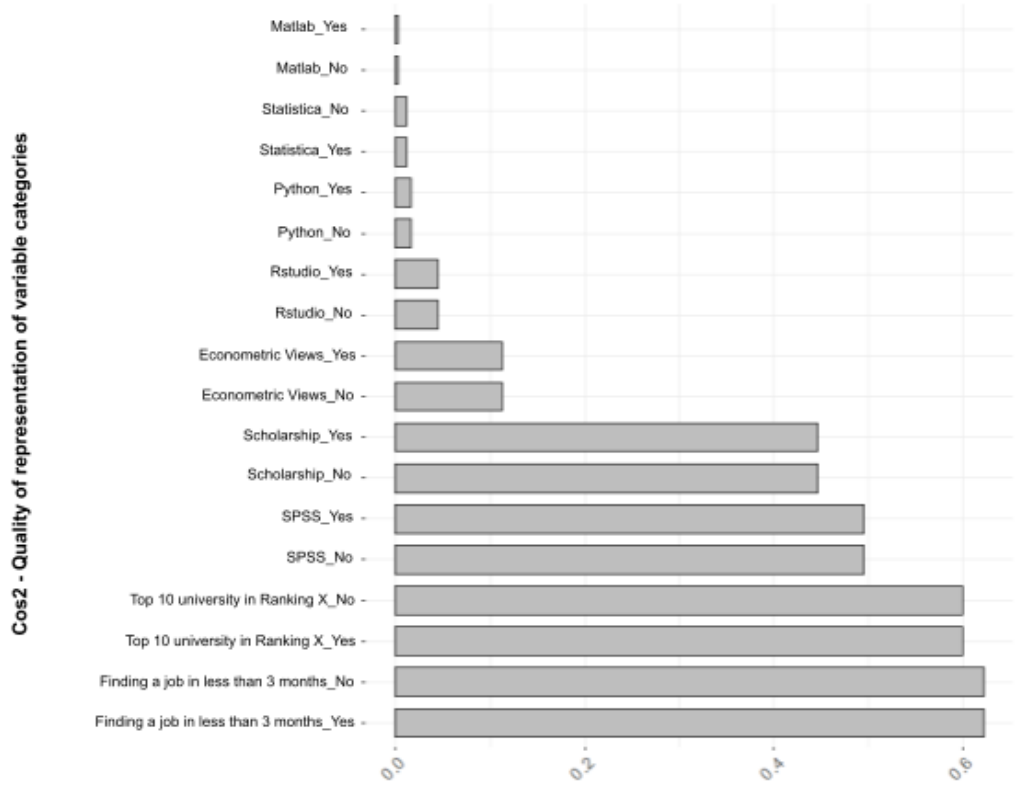

Figure 49. Cos2 - Quality of representation of variable categories for the sum of dimensions 2 and 3

Category Variable Contributions

Figure 48 presents the contributions of variable categories to dimensions 2 and 3. The contributions separately for dimension 2 and 3 are depicted in bar charts on Figure 36 and Figure 40, respectively.

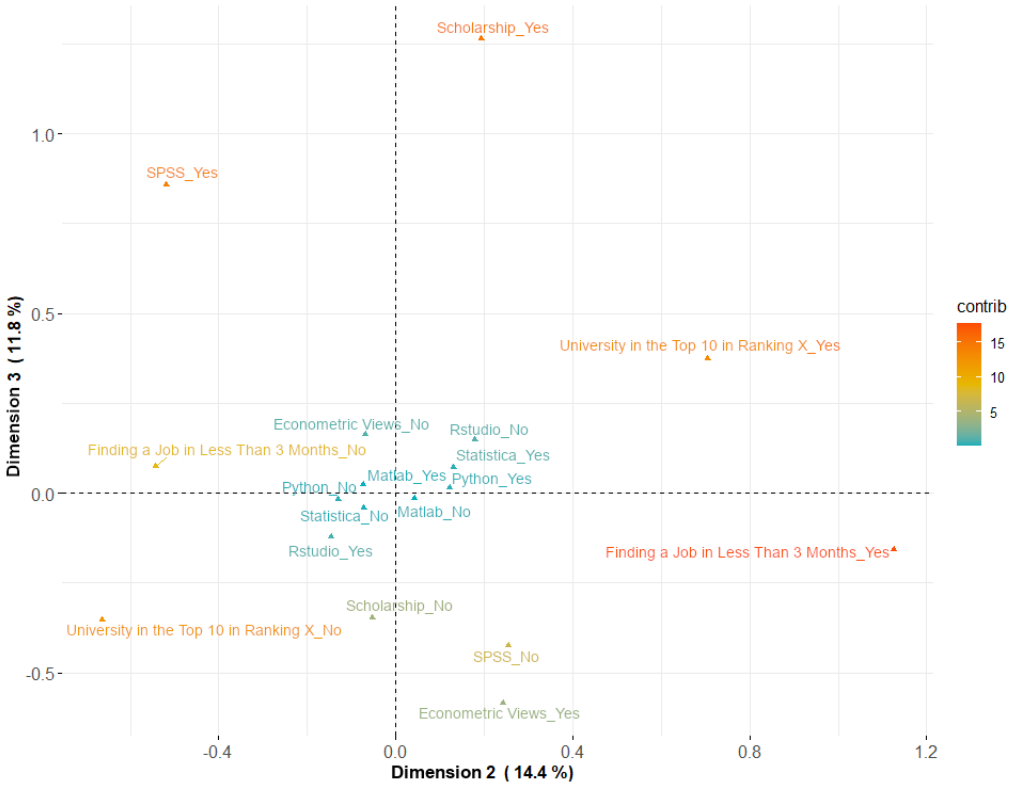

Figure 50. Contributions of variable categories to dimensions 2 and 3

Grouping of Individuals

In Figure 53, four plots of variables with the highest contributions from dimensions 2 and 3 are presented. Individuals representing each category are depicted in the same color. Clear clusters in the population are enclosed by concentration ellipses. The ellipses for the presented variables are not significantly similar, indicating that these variables are not strongly dependent on each other.

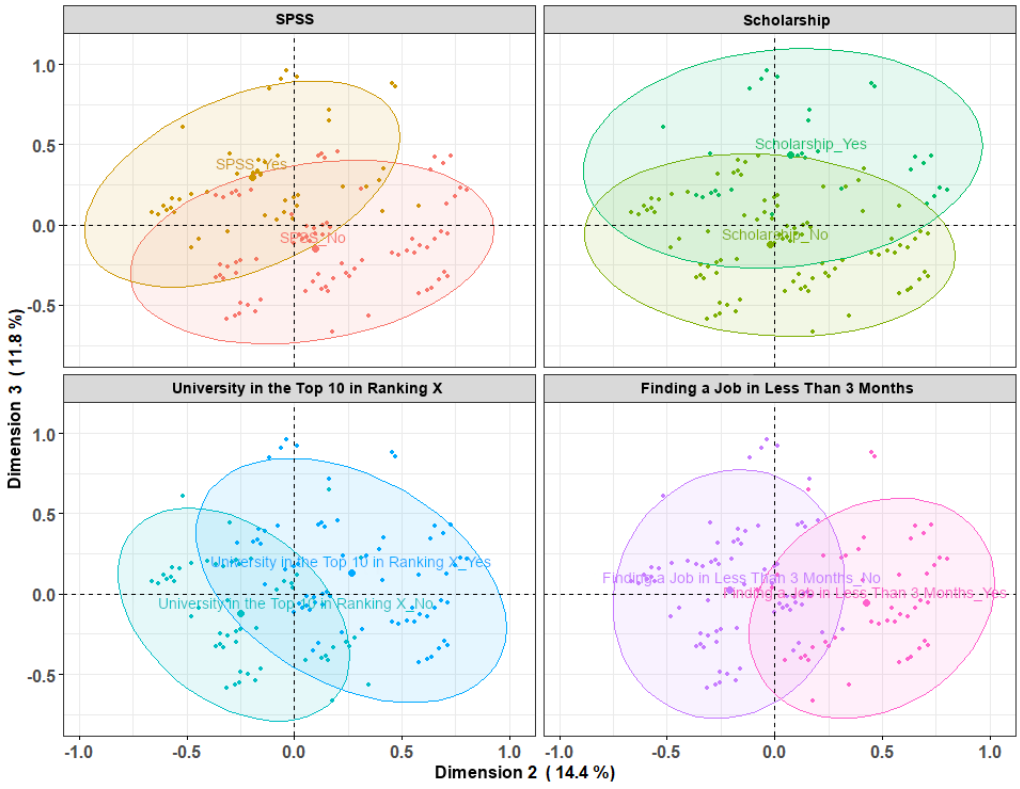

Figure 51. Individuals by groups using levels of variables: "Scholarship," "SPSS," "Top 10 University in Ranking X," "Finding a job in less than 3 months."

Filtering - 5 Individuals and Category Variables with the Highest Contribution

Figure 54 depicts 5 individuals and 5 variables with the highest contributions to dimensions 2 and 3.

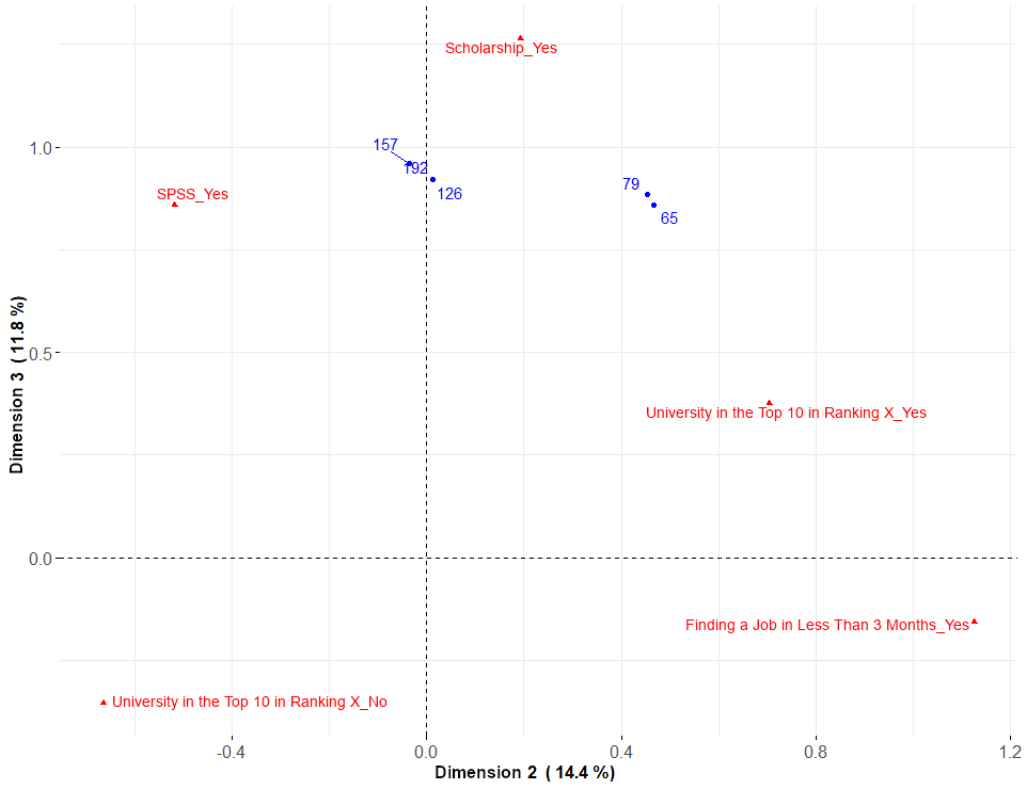

Figure 52. 5 individuals and categories with the greatest contribution

Linear Models

Initial Models

In the following tables, you can find single-factor linear models explaining the variable "Time to Find a Job." Each model separately elucidates the influence of a specific variable on the explained variable.

The model in Table 16 had a statistically significant impact on the time to find a job. Graduates from a different type of university had 4.33 times less chance of finding a job faster than graduates from a university ($p<0.05$). Another model, which contains a significant impact of a variable on the explained variable, is in Table 20. The variable "Top 10 University in Ranking X" significantly influences the time to find a job ($p<0.05$). This means that graduates from universities outside the top 10 in Ranking X had higher chances of finding a job faster than graduates from universities in the top 10 (OR=3.54).

The remaining models contain statistically insignificant results regarding the impact of variables on the explained variable.

Table 15. Initial model for time to find a job (months) by gender

Variable	Coefficient	Std. Error	Stat. z	p-value	OR	Lower Confidence Interval	Upper Confidence Interval
(Intercept)	5,981	0,359	16,646	0,000	396,03	194,97	804,41
GenderFemale	0,269	0,530	0,507	0,613	1,31	0,46	3,72

Table 16. Initial model for time to find a job (months) by university type

Variable	Coefficient	Std. Erro r	Stat. z	p-value	OR	Lower Confidence Interval	Upper Confidence Interval
(Intercept)	6,612	0,374	17,68	0,000	744,152	355,929	1555,821
TypeOfUniversityPolytechnic	-0,678	0,604	-1,12	0,263	0,508	0,154	1,670
TypeOfUniversityOther	-1,466	0,689	-2,13	0,035	0,231	0,059	0,898

Table 17. Initial model for time to find a job (months) by study mode

Variable	Coefficient	Std. Error	Stat. z	p-value	OR	Lower Confidence Interval	Upper Confidence Interval
(Intercept)	5,841	0,332	17,608	0,000	344,22	178,938	662,15
ModeOfStudyPartTime	0,959	0,622	1,540	0,125	2,61	0,764	8,90
ModeOfStudyEvening	0,200	0,829	0,242	0,809	1,22	0,238	6,27

Table 18. Initial model for time to find a job (months) by degree level

Variable	Coefficient	Std. Error	Stat. z	p-value	OR	Lower Confidence Interval	Upper Confidence Interval
(Intercept)	5,942	0,316	18,790	0,000	380,9	204,134	710,60
Level2	0,533	0,573	0,931	0,353	1,7	0,551	5,27

Table 19. Initial model for time to find a job (months) by field of study

Variable	Coefficient	Std. Error	Stat. z	p-value	OR	Lower Confidence Interval	Upper Confidence Interval
(Intercept)	5,913	0,786	7,519	0,000	369,830	78,416	1744,21
FieldOfStudy BigData	0,754	1,100	0,685	0,494	2,125	0,242	18,62
FieldOfStudy Econometrics	0,504	1,100	0,458	0,648	1,655	0,189	14,50
FieldOfStudy Economics	0,405	1,125	0,360	0,719	1,500	0,163	13,78
FieldOfStudy DataScience	-0,277	1,024	-0,270	0,787	0,758	0,101	5,72
FieldOfStudy Mathematics	0,181	1,031	0,175	0,861	1,198	0,157	9,15
FieldOfStudy AppliedMathematics	0,063	0,978	0,065	0,949	1,065	0,155	7,33

Table 20. Initial model for time to find a job (months) by the presence of the university in the top 10 in Ranking X

Variable	Coefficient	Std. Error	Stat. z	p-value	OR	Lower Confidence Interval	Upper Confidence Interval
(Intercept)	5,45	0,374	14,59	0,000	233,60	111,75	488,3
University in the Top 10 in Ranking XNo	1,26	0,521	2,43	0,016	3,54	1,27	9,9

Table 21. Initial model for time to find a job (months) by receiving a scholarship

Variable	Coefficient	Std. Error	Stat. z	p-value	OR	Lower Confidence Interval	Upper Confidence Interval
(Intercept)	5,977	0,570	10,490	0,0	394,15	128,145	1212,36
ScholarshipNo	0,163	0,643	0,254	0,8	1,18	0,331	4,18

Final Model

Based on the analysis of the multiple linear regression model (after applying the backward stepwise variable elimination method), we conclude that studying at universities classified as "other," i.e., not universities or polytechnics, reduced the chances of longer job search time by 4.55 times compared to universities ($p<0.05$). Studying at a university that was not included in the top 10 in Ranking X increased the chances of finding a job faster (OR=3.669).

Table 22. Final model for time to find a job (months) depending on parameters such as gender, age, and those directly related to the university and learning outcomes.

Variable	Coefficient	Std. Error	Stat. z	p-value	OR	Lower Confidence Interval	Upper Confidence Interval
(Intercept)	5,96	0,451	13,23	0,000	388,488	159,753	944,727
TypeOfUniversityPolytechnic	-0,71	0,596	-1,19	0,235	0,492	0,152	1,593
TypeOfUniversityOther	-1,51	0,680	-2,23	0,027	0,220	0,058	0,841
University in the Top 10 in Ranking XNo	1,30	0,517	2,51	0,013	3,669	1,323	10,173

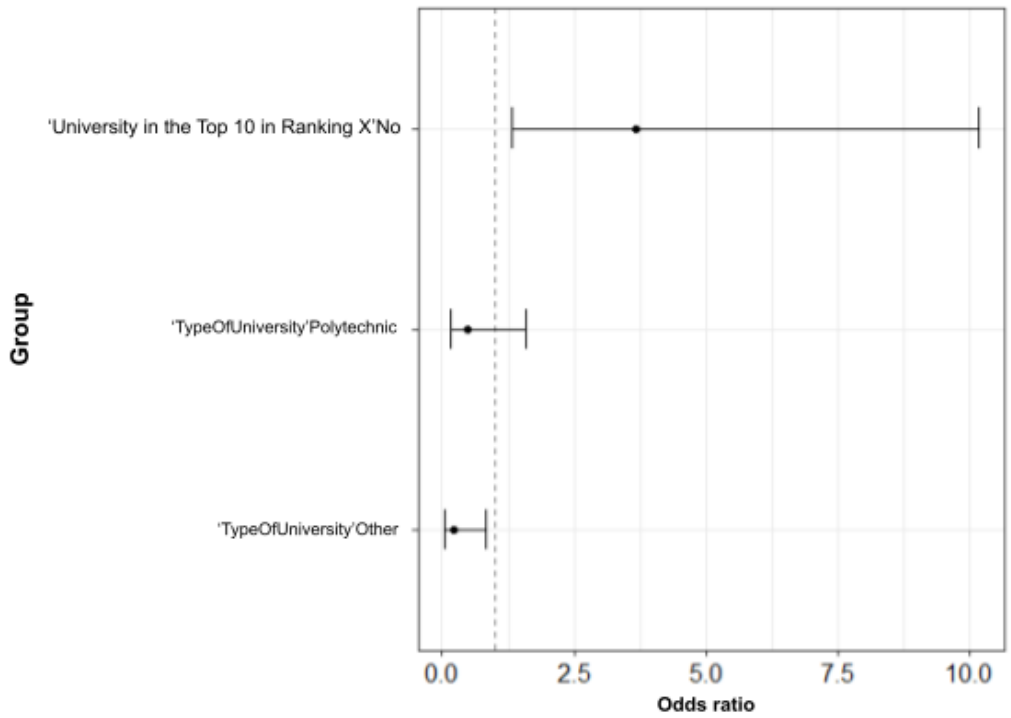

Figure 53. Odds Ratios (OR) for the stepwise linear regression model.

Ordinal Regression Model

Table 23 contains initial results for the ordinal regression model explaining satisfaction with studies.

After eliminating the non-significant variables, we obtain the model found in Table 24. It includes only one variable: "Finding a job in less than 3 months" (p=0.060). The odds ratio (OR=0.608) indicates that graduates who found a job in less than 3 months are 1.645 times more likely to respond with higher ranks than students who did not find a job in less than 3 months.

Preliminary Model

Table 23. Preliminary ordinal regression model for the variable satisfaction with studies.

Variable	Coefficient	Std. Error	Stat. z	p-value	OR	Lower Confidence Interval	Upper Confidence Interval
GenderM	-0,019	0,258	-0,076	0,940	0,981	0,592	1,62
CityCity 2	-0,323	0,384	-0,843	0,399	0,724	0,341	1,53
CityCity 3	0,261	0,414	0,630	0,529	1,298	0,577	2,92
CityCity 4	0,410	0,418	0,981	0,326	1,507	0,664	3,42
Age	0,004	0,032	0,131	0,895	1,004	0,943	1,07
TypeOfUniversityPolytechnic	-0,311	0,359	-0,866	0,386	0,733	0,362	1,48
TypeOfUniversityUniversity	-0,499	0,326	-1,529	0,126	0,607	0,320	1,15
MogeOfStudyEvening	-0,112	0,411	-0,274	0,784	0,894	0,399	2,00
MogeOfStudyPartTime	-0,193	0,304	-0,633	0,527	0,825	0,454	1,50
Level	-0,112	0,277	-0,405	0,685	0,894	0,519	1,54
Time to Find Employment (months)	-0,104	0,063	-1,657	0,098	0,902	0,798	1,02
Finding a Job in Less Than 3 MonthsYES	-0,816	0,464	-1,759	0,079	0,442	0,178	1,10

Table 24. Intercept coefficients for the ordinal regression model explaining satisfaction with studies.

Very Satisfied|Satisfied	Satisfied|Rather Satisfied	Rather Satisfied|No Opinion	No Opinion|Dissatisfied	Dissatisfied|Rather Dissatisfied	Rather Dissatisfied|Very Dissatisfied
-4,1	-2,56	-1,55	-0,722	-0,165	0,926

Final Model

Table 25. Ordinal regression model for the variable satisfaction with studies.

Variable	Coefficient	Std. Error	Stat. z	p-value	OR	Lower Confidence Interval	Upper Confidence Interval
Finding a Job in Less Than 3 MonthsYES	-0,498	0,264	-1,88	0,060	0,608	0,362	1,02
Very Satisfied|Satisfied	-2,942	0,316	-9,30	0,000			
Satisfied|Rather Satisfied	-1,419	0,197	-7,20	0,000			
Rather Satisfied|No Opinion	-0,433	0,170	-2,55	0,011			
No Opinion|Dissatisfied	0,367	0,170	2,15	0,031			
Dissatisfied|Rather Dissatisfied	0,914	0,182	5,02	0,000			
Rather Dissatisfied|Very Dissatisfied	1,999	0,242	8,26	0,000			

Table 26. Intercept coefficients for the ordinal regression model explaining satisfaction with studies.

Very Satisfied|Satisfied	Satisfied|Rather Satisfied	Rather Satisfied|No Opinion	No Opinion|Dissatisfied	Dissatisfied|Rather Dissatisfied	Rather Dissatisfied|Very Dissatisfied
-2,94	-1,42	-0,433	0,367	0,914	2

Logistic Regression Model

Based on the multiple factor analysis (after applying the backward stepwise variable elimination method), six statistically significant factors influencing the time to find a job in less than 3 months were identified. Higher values in the assessment of satisfaction with

studies reduced the chances of finding a job faster by 0.81 times ($p<0.05$), while higher values of the average grade from studies increased these chances by 1.87 times ($p<0.05$). For individuals studying at a polytechnic or a university of a different type (not being a polytechnic or university), the chances of finding a job in less than 3 months were 2.19 and 3.57 times lower, respectively, than for those studying at universities. Part-time study mode, in comparison to full-time mode, increased the chances of the subjects finding a job faster by 2.938 times ($p<0.05$), while studying at a university outside the top 10 in Ranking X increased them by 3.207 times ($p<0.01$).

Table 27. Model performed using the stepwise method for finding a job in less than 3 months, depending on parameters such as gender, age, and those directly related to the university and learning outcomes.

Variable	Coefficient	Std. Error	Stat. z	p-value	OR	Lower Confidence Interval	Upper Confidence Interval
(Intercept)	-1,199	1,275	-0,940	0,347	0,301	0,024	3,626
Type Of UniveristyPolytechnic	-0,785	0,391	-2,005	**0,045**	0,456	0,209	0,978
Type Of UniveristyOther	-1,275	0,451	-2,824	**0,005**	0,280	0,113	0,671
Mode of StudyPart-time	1,078	0,434	2,481	**0,013**	2,938	1,299	7,235
Mode of StudyEvening	0,109	0,499	0,218	0,827	1,115	0,426	3,070
University in the Top 10 in Ranking XNo	1,165	0,342	3,409	**0,001**	3,207	1,663	6,383
Satisfaction with Studies	-0,211	0,099	-2,121	**0,034**	0,810	0,663	0,981
Average GPA	0,626	0,306	2,044	**0,041**	1,870	1,037	3,464

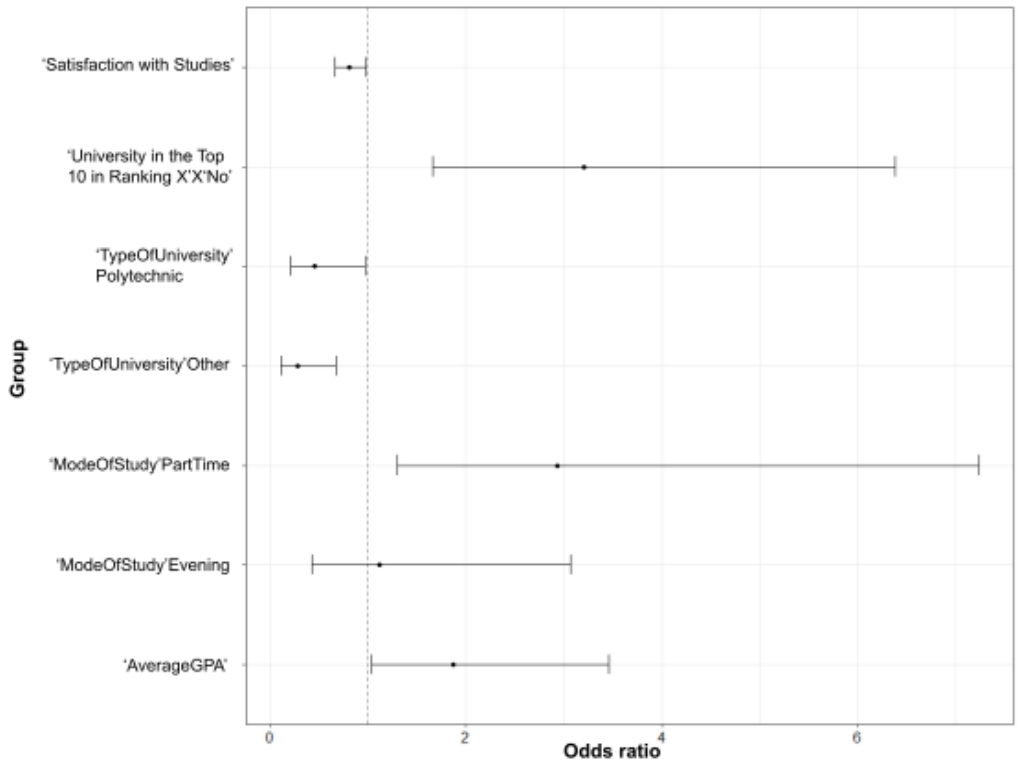

Figure 54. Odds Ratios (OR) for the logistic model performed using the stepwise method.

List of Tables

List of Figures