

# Research on the existence of a gender gap among graduates of different areas of training, manifested in differences in salary levels and the percentage of employment of men and women

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# Introduction



**Objective:** to explore if a gender gap exists among graduates in different fields, shown by differences in wages and employment rates

**Research Question:** does a gender gap exist in salary and employment outcomes among graduates?

## Rationale:

- Equality: identifies gender barriers for fairer policies
- Policy Support: helps shape programs to reduce gender disparities
- Economic Growth: closing the gap boosts productivity
- Corporate Reputation: promotes equality, improving business competitiveness

# Literature Review



I.A. Nikolaev's  
paper "Gender  
Wage Gap"



"Meta-analysis of  
the gender pay  
gap in Russia" by  
S.Y. Roshchin and  
N.K. Emelina



Alexander  
Mikhailovich  
Panov "Gender  
Analysis of the  
Russian Labor  
Market"

# Description of data, Intelligence analysis of data

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The research investigates if there is a gender gap among graduates across different fields, reflected in wages and employment rates. Data is sourced from the “Work of Russia” portal and the “To be precise” platform, covering graduate employment and salaries for 2023

Nº	Variable	Variable description	Number of absences	Unit	Type	Status
1	object_level	Level of territorial unit (region)	0	-	String	The variable of interest
2	object_name	Name of territorial unit (region)	0	-	String	The control variable
3	gender	Gender of Graduate: - Male - Female - Total	0	-	String	The variable of interest
4	education_level	Level of education: - Secondary vocational education (SVE): skilled workers and clerks - SVE: middle-level specialists - Bachelor's degree, specialization - Master's degree	0	-	String	The variable of interest
5	year	The year of graduation	0	-	Integer	The variable of interest
6	study_area	Field of education	0	-	String	The variable of interest
7	specialty_section	Enlarged group of	0	-	String	The

Nº	Variable	Variable description	Number of absences	Unit	Type	Status
		directions (for enrollment with a breakdown by training direction)				control variable
8	specialty	Field of study (for enrollment by field of study) by field of study)	0	-	String	The control variable
9	specialty_code	Code of training direction (for enrollment by training direction)	0	-	String	The control variable
10	count_graduate	Number of graduates	0	Person	Integer	The control variable
11	percent_employed	Share of employed graduates as of as of 31.12.2023. When calculating share of employed graduates did not Those who continued their education were not taken into account (e.g., in a master's program after completing bachelor's degree)	174 782 <sup>1</sup>	Percent	Float	The control variable
12	average_salary	Average salary in 2023 (irrespective of year of graduation)	0	Ruble	Float	The dependent variable

Nº	Variable	Variable description	Number of absences	Unit	Type	Status
13	oktmo	Regional OCTMO code	0	-	String	The control variable
14	okato	Regional OKATO code	0	-	String	The control variable

## **Key variables include:**

- Gender
- Education Level (e.g., Bachelor's, Master's)
- Year of Graduation
- Field of Study (e.g., Engineering, Humanities)
- Employment Rate and Average Salary

# Known Limitations

- Data Completeness: Salary data is hidden for some graduates for confidentiality, especially in smaller groups. For example, salary data is unavailable for some graduates in Pskov but accessible in Kostroma.
- Missing Data: No data for "Total" gender in the Ural Federal District.
- Informal Sector: Graduates working informally are not counted as employed, affecting salary calculations.
- Graduation Numbers: The reported number of graduates may not reflect actual numbers due to data entry discrepancies.

# Changes made

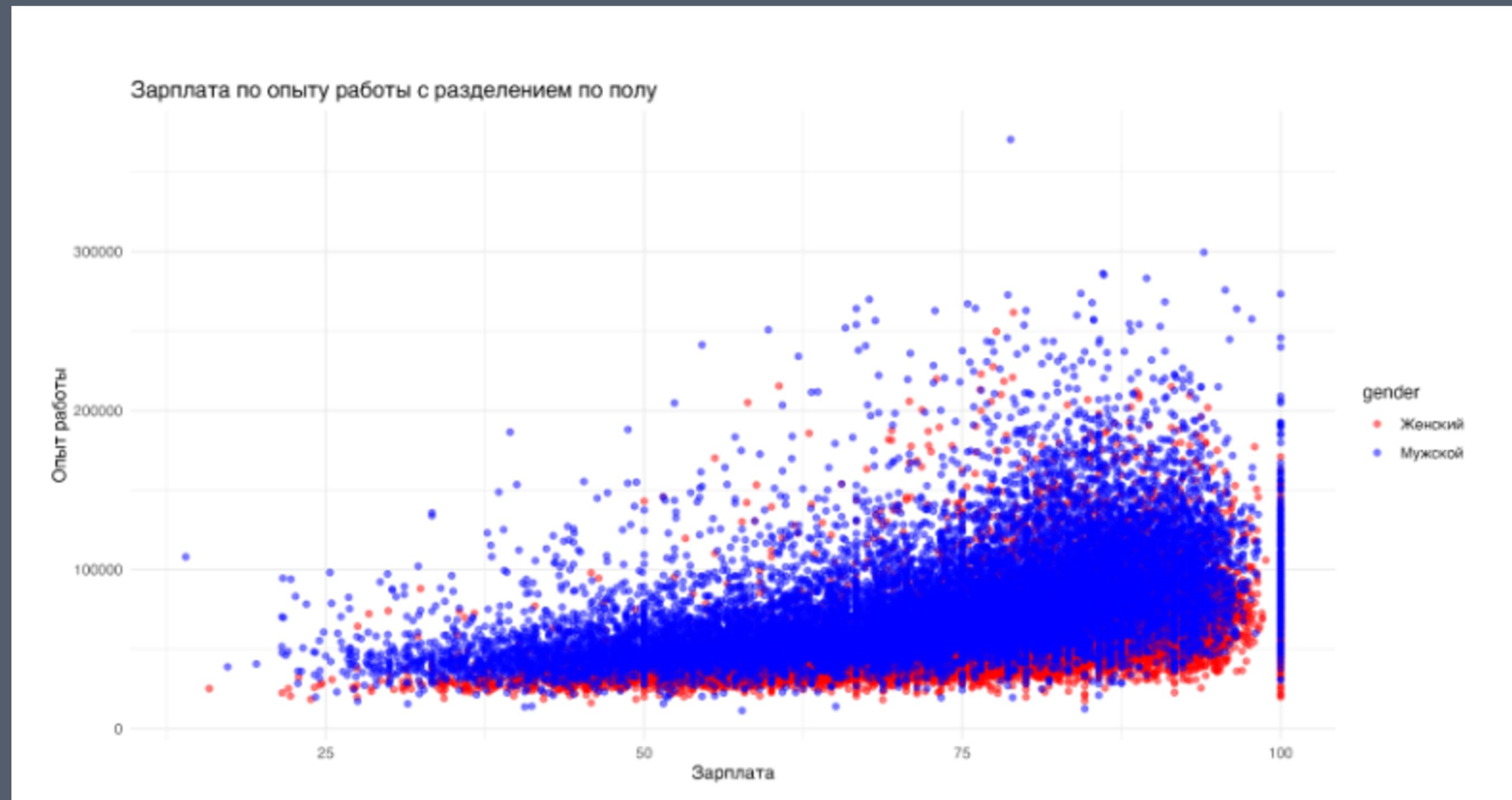
- Corrected errors in training direction categories (e.g., "Service and Tourism").
- Cleaned and adjusted data for analysis (e.g., converted "Year" to numeric).
- Removed unnecessary variables ("ALL" gender, "OCTMO", "OKATO").
- Added a "Yearofexp" column to track years since graduation for work experience.

Descriptive statistics →

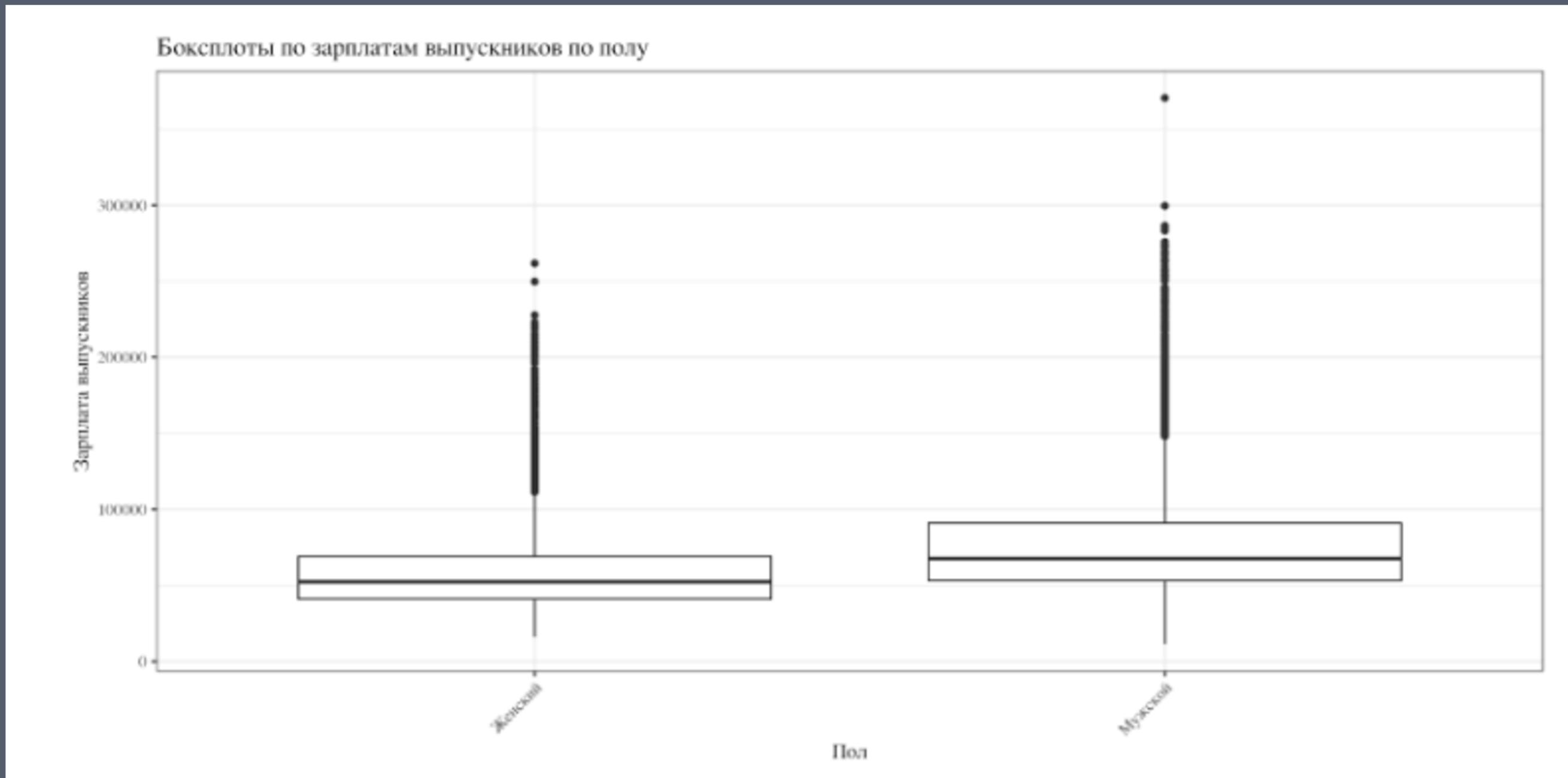
Table: descriptive statistics of the main variables - total number of graduates, proportion of employed graduates and their average salary

Column	Unique	Missing	Mean	SD	Min	Median	Max
average_salary	31649	0	67713.43	31259.58	11333.33	59969.56	370546.09
percent_employed	8962	0	74.4	14.25	13.99	76.47	100
count_graduate	1990	0	231.01	627.28	11	70	21330

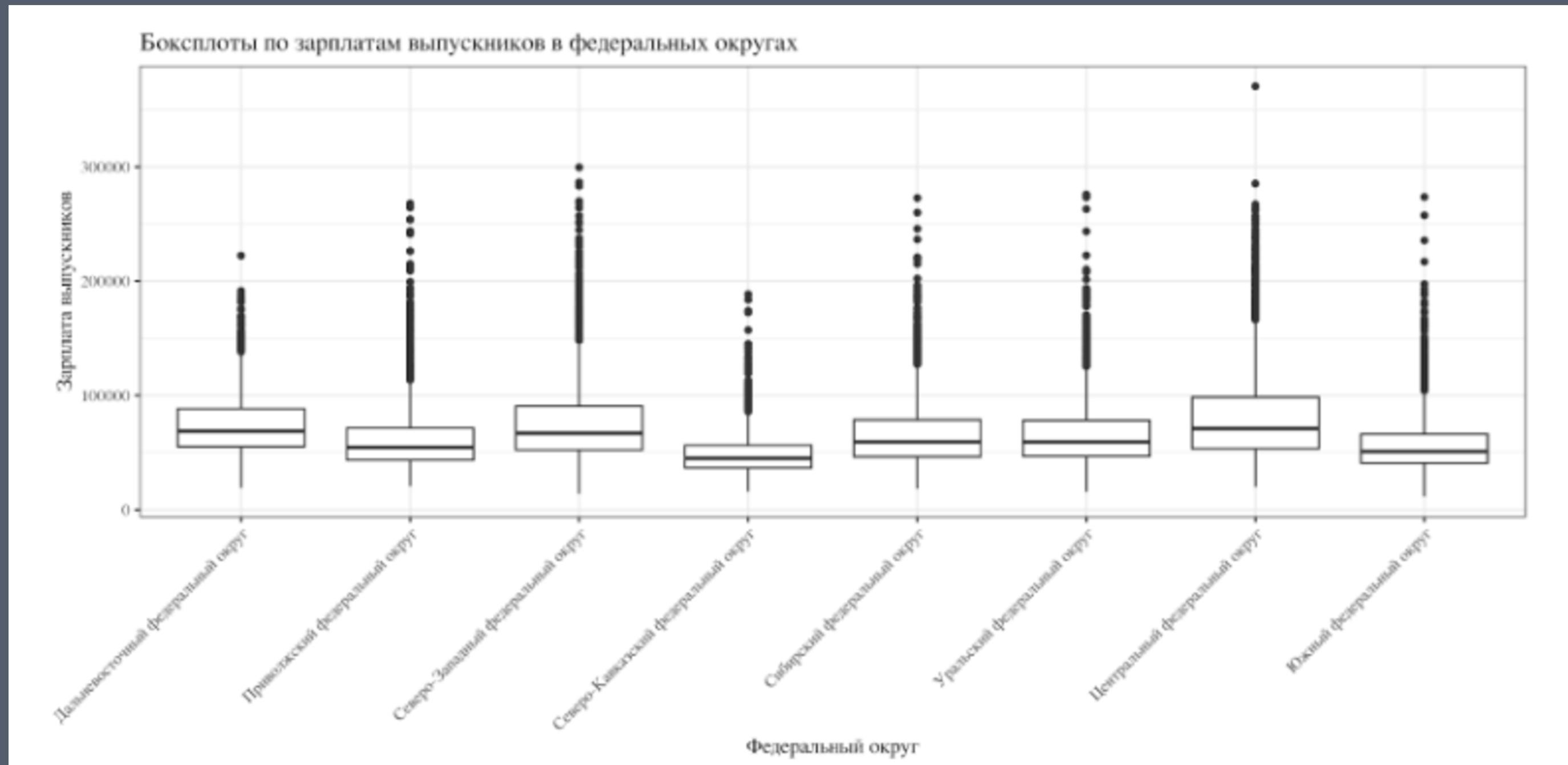
# Graph №1: dependence of graduates' salaries on their gender and amount of work experience



## Graph №2: Boxplots of graduate salaries by gender



# Graph №3: Boxplots of graduate salaries in federal districts



# Formulation and Justification of the Models

H0: Employee's gender has no effect on their job opportunities and salary.

H1: The gender of an employee affects the process of his/her employment opportunities and salary.

# Model №1

$$\text{AverageSalary} = b_0 + b_1 * \text{Gender} + U_i$$

H<sub>0</sub>: B<sub>1</sub> = 0. The gender of the graduate has no effect on his/her wage level.

H<sub>1</sub>: B<sub>1</sub> ≠ 0. The gender of the graduate has no effect on the level of his/her salary.

# Model №2

AverageSalary = b0 + b1\*Gender + b2\*Yearofexp + Ui

# Model №3

AverageSalary = b0 + b1\*Gender + b2\*Yearofexp +  
+b3\*EducationLevel + Ui

# Model №4

AverageSalary = b<sub>0</sub> + b<sub>1</sub>\*Gender + b<sub>2</sub>\*Yearofexp +  
+b<sub>3</sub>\*EducationLevel + b<sub>4</sub>\*StudyArea + U<sub>i</sub>

# Model №5

AverageSalary = b<sub>0</sub> + b<sub>1</sub>\*Gender + b<sub>2</sub>\*Yearofexp +  
+b<sub>3</sub>\*EducationLevel + b<sub>4</sub>\*StudyArea + b<sub>5</sub>\*ObjectName + U<sub>i</sub>

## Expected Results:

- Goal: Identify a gender gap in wages and employment among graduates in different fields.
- Model: Linear regression with salary as the dependent variable and gender, experience, education, field of study, and region as independent variables.
- Gender: Expect a wage gap due to societal factors, with men earning more than women, all else equal.
- Experience: Positive correlation with salary; more experience leads to higher wages.
- Education: Higher education linked to higher earnings.
- Field of Study: Gender-based preferences may lead to wage disparities across fields.
- Region: Wage differences expected between federal districts based on regional economic conditions.
- Conclusion: The study will assess the gender gap in wages and employment, considering other factors like experience, education, and region.

## Regression Analysis Results

1. Gender: the coefficient for genderMale remains positive and statistically significant across all models, ranging from 17,848.75 (Model 1) to 20,176.20 (Model 3).
2. Experience: each additional year of experience is associated with an increase in salary of around 4,900 rubles.
3. Education: graduates with a Master's degree earn significantly more, with an increase of approximately 18,119.97 rubles compared to those with lower post-secondary education, who experience wage reductions of around 20,000 to 29,000 rubles depending on their specific education level.
4. Field of Study: certain fields, such as Engineering, Technology, and Technical Sciences, have a high positive effect on wages, with an increase of about 21,609 rubles in Model 3. Fields like Agriculture and Social Sciences have lower wage increases.
5. Regional Differences: Significant regional wage disparities are observed. For instance, the North Caucasus Federal District shows a sharp negative effect (-26,799 rubles), while the Central Federal District shows a small positive effect (+2,591 rubles).

## Analysis of Results:

- Total Observations: 31,666 in all models.
- R<sup>2</sup>: Increases from 0.081 (Model 1) to 0.530 (Model 5), indicating better wage explanation with more variables.
- Standardized Residual Std. Error: Decreases from 29,959.53 (Model 1) to 21,445.87 (Model 5), showing improved prediction accuracy/

## Model Analysis:

- Model 1: Gender alone explains 8.1% of wage variation. Men earn +17,848.75 more (p<0.01).
- Model 2: Adding work experience increases R<sup>2</sup> to 0.135. Each year of experience adds +5,151.02 to salary.
- Model 3: Education added. Higher education increases wages, with Master's degrees earning +18,119.97 more.
- Model 4: Adding study areas increases R<sup>2</sup> to 0.447. Engineering/Tech fields have the largest wage impact (+21,609.08).
- Model 5: Federal districts added. Location shows significant effects; North Caucasus has the largest negative impact (-26,799.01).

## Answer to the research question:

We reject the null hypothesis and conclude that gender significantly impacts both employment opportunities and salary. In every model, the genderMale variable shows a positive and statistically significant effect on wages. On average, men earn 18,000 to 20,000 rubles more than women, confirming the existence of a gender wage gap

# Critical Analysis of Results and Limitations

Key limitations include missing variables (e.g., socioeconomic factors, graduate skills), multicollinearity (e.g., years of experience and education level), and potential bias due to endogeneity (e.g., choice of field of study based on salary expectations). Additionally, categorical variables could increase model complexity and multicollinearity.

# Suggestions for Future Research:

- Track long-term career progress to analyze evolving gender wage gaps.
- Supplement quantitative data with qualitative research for deeper insights.
- Conduct cross-cultural comparisons to identify factors influencing gender gaps.
- Investigate the impact of family responsibilities on career outcomes.
- Analyze how employer gender equality policies affect wages and employment rates.

# Conclusion

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Our study found a significant gender gap in salary among graduates, with men earning more than women, even after accounting for education, experience, and field of study. This suggests factors beyond qualifications contribute to the gap. Future research could explore causes like discrimination and occupational segregation.

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