Brief Analysis of the Evolution of Female Employees in Recent Years. Research Using Visual Representation

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Abstract

The numbers of male against female employment is still an actual and sensitive issue. Thus, the actual analysis of male and female employment evolution can offer a more accurate image of the present state of female disadvantages or advantages. One of the more used methods of analysis is visualizations of data evolutions with the help of coding modules. This kind of method offers the possibility to enhance the evolutions and influences between different data values. The objective of this paper is the use of this method to show the evolutions of male and female employment under the evolution of different indices. The obtained visual representation showed, clearly, a more pronounced upward trend for the male employment than female. Also, the number of female employments is more likely to remain constant even in the case of increasing values of other indices.

Key words: female employment, data visualization, employment evolution
J.E.L. classification: J21

1. Introduction

Data visualization, enabled by the power of computing, is one of the essential tools of modern data science. The graphs expose features of the data that statistics and models may slip: unusual data distributions, local patterns, clustering, gaps, missing values, evidence of rounding or crowding, default bounds, outliers, and so on. Graphs advance questions that inspire research and propose ideas.

Following the analysis of present research, about the employment of Romanian female, the results look to conclude in the same way: the employment is far to equal the men employment and, even more, in the last years the values of Romanian female employment drops further.

The visualization analysis can be used to easily show the evolutions of these data and reveal the differences between the female and male employment.

Brush & Burns (2020) said that "benefits of data visualization include the following (Brush & Burns, 2020):

- the ability to quickly absorb information, improve insights and make faster decisions;
- a better understanding of the next steps that need to be taken to improve the organization;
- an improved ability to keep the public interested with information they can understand;
- an easy sharing of information that increases the opportunity to share perspectives with all stakeholders;
- the elimination of the need for data scientists because data is more accessible and easier to understand; and
- an increased ability to act quickly on findings and therefore achieve success with greater speed and fewer mistakes."

The present data values belong to years 2011-2021 and consider the Romanian employment as total, as males and as females. Also, in order to analyze how these values are influenced, more data were implemented in the visualizations: GERD by sector of performance ("Total intramural expenditure on R&D achieved during an explicit historical reference, broken down by the institutions corresponding to each sector (business enterprise, government, higher education and private non-

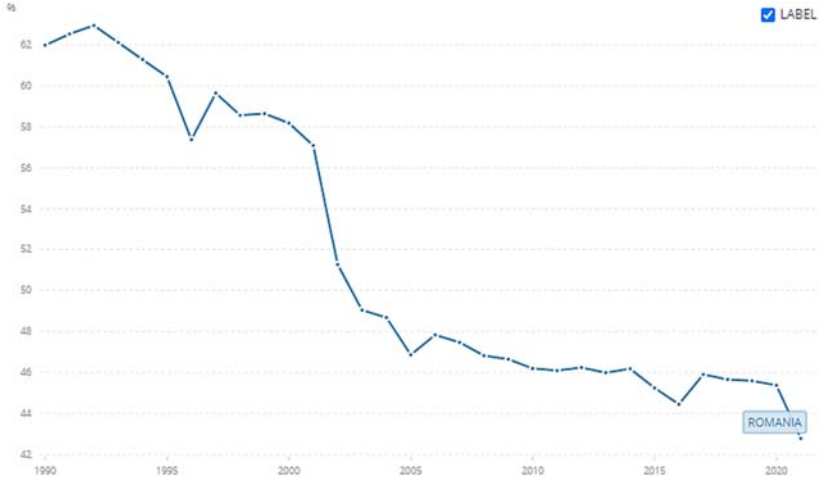
profit organizations), independent of the source of funds", according to EUROSTAT), Gross domestic product at market prices, Total investment in industrial field and Production value.

Thus, the main objective of the present paper is to model data to a better visualization of female against men (and total) values of employment. The main objective is to conclude the evolution of these values. The importance of the research comes from the development of codes that can be further used for different types of data values. Also, the values representation can be very easy read and understood.

2. Literature review

Females continue to be a disadvantaged social group at regional and national level and their existence in the labor market is insufficiently noticeable (Șteliac, 2015). According to Word Bank (2022), participation rate of the female to the labor force decreases with 20% from 1990 to 2021, see figure 1.

Figure no. 1. Evolution of labor, female force participation rate (% of female population ages 15+).



Source: World Bank Group, 2022

Also, according to European Institute for Gender Equality (2017), after an analyze on gender equality in Romania between 2005-2015, the equality has seen a slight decline, as gender equality gender gaps in labor market participation and segregation have widened. The employment rate (20-64 years) is 57% for female compared to 74% for male. When the number of hours worked is considered, the full-time equivalent (FTE) employment rate for female is around 41%, compared to 58% for male.

3. Research methodology

The applied method is construction of code modules in Python, using Colab Notebooks from Google Drive, for the visualization of data representation and emphasis of evolutions. The python modules used were:

1. numpy as np;
2. pandas as pd;
3. pyplot from matplotlib as plt;
4. seaborn as sns

Example of the applied Python code is:

Figure no. 2. Code example (sns) for total employment vs. 'GERD by sector of performance.

```
sns.jointplot(y = table['Employment_Total'], x = table['GERD by sector of performance'],
kind='kde ', fill=True, cmap='brg_r', space=0.2, zorder=20, levels=100)
```

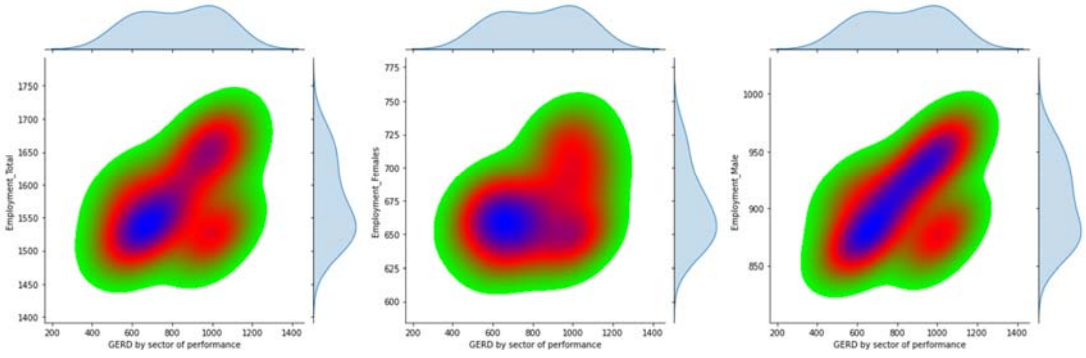
Source: Author's model in Python.

The application of coding results in several figures, that show the evolutions of employment under the influence of growth of the following indices, as follows: GERD by sector of performance, Gross domestic product at market prices, Total investment in industrial field and Production value.

4. Findings

After the application of Python code to the data values the following visualization were obtained.

Figure no. 3. Evolution of employment vs. GERD by sector of performance: a) total employment; b) female employment; c) male employment.

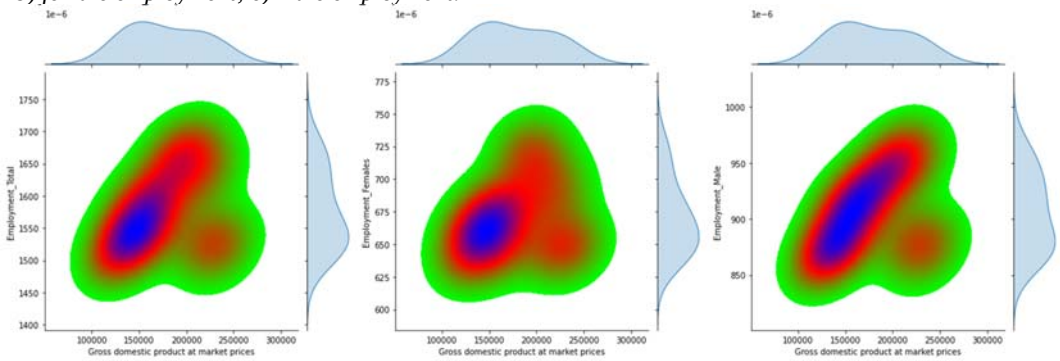


a) b) c)

Source: Author's model in Python.

Analyzing the image from figure 3 we can conclude that the GERD increase is directly proportional to the increase of male employment, which has a more accentuate growth as the total employment. This can be explained by the evolution of female employment, which remain almost constant even with the increase of the GERD. Thus, the evolution of total employees do not have the same evolution as GERD. More than that, there is a number of employees that remain constant even with the rise of GERD, fitting to the values near the 1000 GERD. This belongs to the employees that are not influenced by GERD evolution and is looks specific to female employees.

Figure no. 4. Evolution of employment vs. Gross domestic product at market prices: a) total employment; b) female employment; c) male employment.

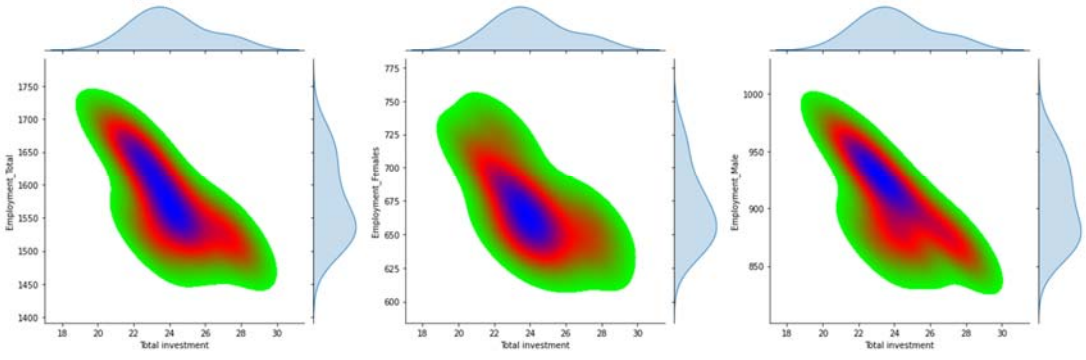


a) b) c)

Source: Author's model in Python.

Almost the same as the evolutions from figure 3, we can see in figure 4. The differences occur when we are looking to the female employment. The number looks smaller when we analyze the GDP evolution. This shows that the number of male employees is more likely to be influenced by the GDP evolution. Also, the constant number of total employees is less influenced by the GDP than by the GERD.

Figure no. 5. Evolution of employment vs. Total investment: a) total employment; b) female employment; c) male employment.

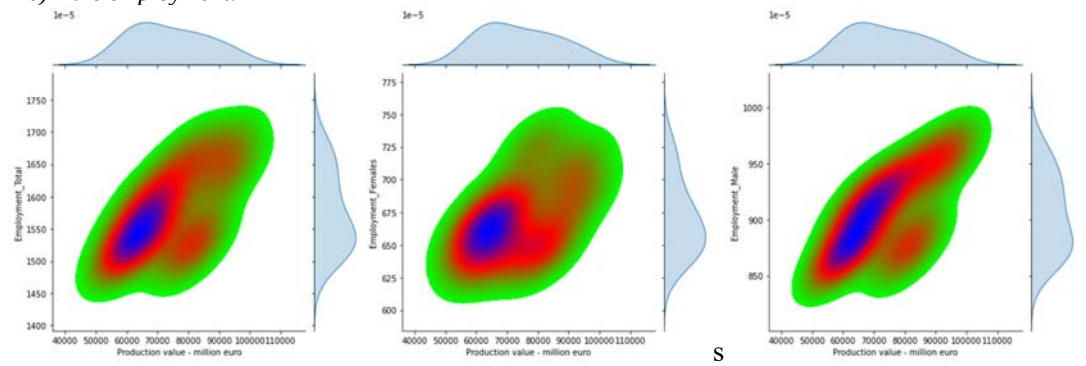


a) b) c)

Source: Author's model in Python.

The first conclusion form analyzing figure 5, is the relation of inverse proportionality of total investments to all form of employment. The largest number of male employees belongs to the higher values of investments, while the most female employees fit to the median values of investments.

Figure no. 6. Evolution of employment vs. Production value: a) total employment; b) female employment; c) male employment.



a) b) s c)

Source: Author's model in Python.

In figure 6 the evolutions of male and female employment are similar with their evolutions influenced by the GRD and GDP. The differences are the male employment increase accordingly with the growth of Production, but the value decreases at the top of production values. Also, the number of female employees is more constant than the male employees (between 7000 – 8000 Production value)

5. Conclusions

The first conclusion that can be drawn is the direction of proportionality. As the GERD, GDP and Production values are direct proportional with the evolution of employment (total, female, and male), the investment has an invers proportionality.

Considering all the indices, the number of female employees is always not only smaller than the males, but, also, with much smaller trend of growth than the males employment. Also, there is a constant in the value of the female employment evolution even in the case of increasing values of all other indices. Thus, the male employment looks to be more influenced by the evolution of other indices. This can conclude that even with the activities, actions, and policies to increase female employability, their numbers do not increase with same trend and values as the other macroeconomics indices.

6. References

- Șteliac, N., 2015. *What Are the Female Employment and Unemployment Patterns on The Romanian Labour Market?,* [online] Available at: https://www.researchgate.net/publication/280306700_WHAT_ARE_THE_FEMALE_EMPLOYMENT_AND_UNEMPLOYMENT_PATTERNS_ON_THE_ROMANIAN_LABOUR_MARKET, [Accessed June 2022]
- Brush, K., Burns, E., 2020. Data visualization, *TechTarget, Search Business Analytics*, [online] Available at: https://www.techtarget.com/searchbusinessanalytics/definition/data-visualization, [Accessed June 2022]
- World Bank Group, 2022. Labor force participation rate, female (% of female population ages 15+) (modeled ILO estimate) – Romania, *International Labour Organization, ILOSTAT database*. [online] Available at: https://data.worldbank.org/indicator/SL.TLF.CACT.FE.ZS?end=2021&locations=RO&start=1990&view=chart , [Accessed June 2022]
- European Institute for Gender Equality, 2017. Gender Equality Index 2017: Romania, *Gender Statistics Database*, [online] Available at: https://eige.europa.eu/gender-statistics/dgs, [Accessed June 2022]