Data Project Report

Introduction

For this report, there will be an analysis of data about employees in the company to show the Chief Executive and Board of Directors the trends in salaries and bonus payments. The report will look closely at the different countries, departments, genders and ethnicity to understand how these impact on salaries and bonus payments across the company.

Data Preparation

In anticipation of the analysis, the data was cleaned using Python in Jupyter Notebook as a more in-depth cleaning process could be carried out. It was analysed briefly in Microsoft Excel to get an understanding of what data was there and if there were any obvious cleaning processes that would be needed. From this, a list of steps were created for the cleaning process to make sure all elements were covered. This looked at: examining the data to find any problems; finding missing data; removing columns or rows if required; removing unnecessary or duplicate data; normalising data; changing the casing and removing whitespaces; renaming columns; and saving the data in a new file. An in-depth explanation of the cleaning process can be found in the ‘Data\_Cleaning.ipynb’.

There were some significant cleaning decisions made during the process. The removal of data which had a date in the ‘Exit Date’ column, changing the date format from MM/DD/YYYY to DD/MM/YYYY and normalising both the ‘Annual Salary’ and ‘Bonus %’ columns to be integers rather than objects. The first change was made due to the data for employees who had already left the company being irrelevant to the analysis, there was also an abnormal data point in the ‘Annual Salary’ of one of these employees, so removing them also removed the error. The second change made the future analysis easier to understand and allowed the data to be understood by power BI as a date. The final change meant that the values were recognised as integers and could then be analysed with various calculations.

To prepare the data further for analysis, more columns were added, ‘Monthly Salary $’, ‘Bonus Amount $’, ‘Total Salary $’ and ‘Bonus Awarded’. The first used divided the ‘Annual Salary $’ by twelve to discover their monthly salary. The next used the ‘Bonus %’ and ‘Annual Salary $’ columns to work out the bonus in dollars. ‘Total Salary $’ added the ‘Bonus Amount $’ to ‘Annual Salary $’ to show the total salary for that person. Finally, ‘Bonus Awarded’ recorded whether the employee had received a bonus. These additional columns meant that the analysis would be simpler to complete.

Data Analysis

For the analysis, Power BI was used to create the visuals required. It was used as the visuals are simple to create and additional calculations could be carried out and new values saved, such as working out the difference between the ‘Annual Salary $’ and ‘Total Salary $’, which included the bonus amount.

For the company to have a positive turnover, a minimum amount of $104million worldwide needs to be achieved. For Brazil, the turnover needs to be $14million, in China the amount increases to $23million, and in the United States the amount is $67million. This does not include bonuses awarded, which if included adds an additional $14.8million and takes the turnover needed worldwide to $119.14million – Brazil $16.48million, China $25.72million, United States $76.94million. As such, the United States has the largest cost to run, over 4 times the amount Brazil needs and almost 3 times the amount China needs. This is unsurprising though, as out of the 915 worldwide employees, the smallest number come from Brazil with 128 employees, then China with 197 employees, and finally the United States with 590 employees.

A graph of salary and salary

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A map of the world

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When looking at the average age and salary across the company, there is little difference between countries. Worldwide, the average age is 45 and salary is $114,030 – Brazil is 44 and $112,837, China is 46 and $115,286, and United States is 44 and $113,873. When including the bonuses, the amounts increase to $130,210 worldwide, $128,719 in Brazil, $130,558 in China and $130,411 in the United States. Interestingly, when analysing the median age and salary there is more difference. Although the median age does not change massively, 45 for the United States and Brazil and 46 for China, the median salaries do and all drop below $100,000. The median worldwide salary is $97,000, which does not change when including the bonuses, for Brazil the median salary is $96,540 and $96,803 including bonuses, China has a median salary of $99,017 and $99,975 including bonuses, and the United States has a median salary of $96,582, which does not change when bonuses are added. The graphs below show that the general trend is that China typically has older employees with a higher salary, whereas Brazil has younger employees with lower salaries.

A screenshot of a graph

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When salaries are compared to the cost of living[1], the average employee earns well above what is needed. The United States has the highest cost of living at $2433 per month which compared to the average salary per month, $9489.48, has a difference of $7056.48. China and Brazil both have a much larger gap (China $8855.25 and Brazil $8649.13). The difference when looking at the median salary is a drop of over $1000 for all three countries. Despite the averages and median salaries being well above the cost of living, if the minimum salaries are analysed there is a different outcome. In both Brazil and China there is still a significant gap of $2605.67 and $2725.33 respectively, but the United States has a gap of less than $1000, $905.58. This means that for the lowest earning employees at the company in the United States, they are only just earning over the cost of living. At the opposite end, the highest earning employees are all earning around $21,000 per month, over double the average salary.

A graph of different colored bars

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For those who earn bonuses, the average amount they will receive is $33,710. Brazil’s average bonus is slightly higher at $34,460, China has a lower average of $30,390, and the United States has the highest bonus average of $34,720. Across the company though, the United States award the most bonuses, 281 employees earned them, compared to 99 employees in China and 59 in Brazil. This is understandable though, as there are more employees in the United States than the other countries. Across the departments, the amount of bonuses given is fairly consistent, but when looking at job titles there is more discrepancy. Worldwide, there are only six different job titles which have earned bonuses - Vice President, Director, Senior Manager, Manager, Engineering Manager and Computer Systems Manager – out of 33 different titles.

A graph of blue and orange bars

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Recommendations

Although all employees earn above the cost of living for their country, there is an argument about the discrepancy in gap between countries and whether something could be done to ease the burdens of those earning the least. The United States earns significantly less than both Brazil and China when the cost of living is deducted, which for those on the minimum salary could be impacted drastically should an emergency occur.

Whilst analysing the bonuses, it was clear that the highest earning employees were also the ones to receive bonuses. Out of 33 different job titles, only 6 earned a bonus, with 3 of those having the highest average salary company wide, whilst also having the highest bonuses. The amount spent on bonuses across the company is $14.8million, which is a significant amount. This could be distributed more fairly across the company, rather than looking at a small number of job titles, who also tend to earn more on average.

Further analysis could be done with gender and ethnicity to see if there are any discrepancies there. From a brief analysis in the higher earning job titles, Asian employees are typically in those positions – 49 being Directors - with Black employees the fewest number – 5 being Directors. The spread of genders across the departments is fairly even, but analysis could be done looking at the marginalised groups, such as Black females, as to whether this is consistent with all ethnicities.

Conclusion

In conclusion, the country with the highest amount needed to pay for their employee’s salaries is the United States with $76.94million. This is partially due to the highest number of employees also being from that country, but in addition they also have the highest number of employees at a higher paying job title. Further discussion could be had over the distribution of bonuses, to create a fairer system that also rewards those who earn less. A closer look at the cost of living and the differences in salary should be had to make sure all employees are able to live within their salary.

Bibliography

1. [Cheapest Countries to Live in 2024](https://worldpopulationreview.com/country-rankings/cheapest-countries-to-live-in)