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## Foundation Skills in Data Analysis – MIS770

## Assignment 2

## Trimester 3 2021

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# Introduction

This report covers the analysis of the survey responses to the employee satisfaction survey that was run at Globex Corporation. The report will help management gauge the company’s employee views on current state of work culture, job satisfaction, work relationship satisfaction and work life balance. It will also provide management on the employee’s views of the company’s corporate social responsibility. Furthermore, it will provide management with insights on the relationship between the employee’s hourly wage, numbers of hours worked each week, overtime and attrition and if age impacts work life balance.

# Executive Summary

The findings of this report are based on a sample of 1470 respondents.

From the analysis, our key findings were that the yearly annual salary increase for employees was an increase of 4.48% annually. More than half (61.29%) of employees have rated job satisfaction as either very high or high and about 58.11% to 63.11% of employees have rated relationship satisfaction as high or very high which is a good indication of internal company culture being good. Drivers such as number of years employed, and number of hours worked has little to no relationship with the average hourly wage.

In terms of overtime and attrition, what I have found that overtime is not impacting attrition as much, there is a weak relationship, and increase in attrition rates could be driven by other variables that need further investigating. Age is also not seen to be a driver for better work life balance rating.

There was insufficient evidence to conclude that the true hourly wage is more than $70 and that some improvements to the work environment should be put in place as I estimate that only 58.66 to 63.65% of employees rate work environment as high or very high.

# Question 1(a)

Prior to my analysis, I removed survey respondents that have stated that they have worked with the company for less than a year, as having this included may skew the findings of the analysis. Of the sample size of 1426, there were 42 employees’ responses that has been identified as outliers that may need further investigating. I have left these outliers in the analysis, as these may be employees who have performed exceptionally well, so there is value in including them in the analysis.

From the sample data provided, we can observe the average annual salary increase to be 4.48% each year, so just under 5% which is more than the industry standard CPI increase of around 2% - 3% each year. There is a spread of 0.23% in average annual salary increase from the sample average. We can also observe that 50% of Globex’s employees are receiving an annual salary increase of 2.6% or more.  
  
From the sample, I have found the lowest annual increase an employee received was well under 1% at 0.30% and the highest increase sits at 25% annually. The lowest quarter of staff received an annual increase of 0.3% to 2%, whereas the top 10% of employees received an average annual salary increase of 21%. The middle 50% of employees received an annual increase of 2% to 5% annually. There is a difference of almost 25% (24.7%) in annual salary increase between the highest and lowest increase, which is a large range, however the range for the middle 50% of employees were spread over a range of 4% annual increase.

Overall, from the sample, we can conclude that 66% of employees are receiving an average annual salary increase of 4% or less, and 89% of employees are receiving an average annual salary increase of 12% or less, and the remaining 11% of employees have been seen to receive an average annual increase of more than 12%.

# Question 1(b)

I have used all the responses in the sample data to analyse the proportion of employees who are rating job satisfaction as either high or low. There were 1470 respondents in the sample data, and what we found was that there was nearly an equal split between employees who have rated as either very high or high, and an almost equal split between employees who have rated as medium or low.

Overall, 61.29% of employees rated job satisfaction as very high and high, and the remaining 38.71% had given a rating of either medium or low. There is only a 1.2% of difference between the proportion of employees who rated job satisfaction as very high (31.22%) and high (30.07%). There is an even smaller difference of 0.61% between the employees who rated job satisfaction as medium (19.05%) and low (19.66%).

There is a difference of 11.56% between employees who rated as very high and low. The cohort with the most responses were those who rated as very high satisfaction (459) and the cohort with the least number of responses were those who rated medium satisfaction (280).

Overall, from the sample data, we can conclude that majority of employees are satisfied with their jobs, and just under 20% are unsatisfied with their jobs. Although this does provide some indication that the most employees are happy and satisfied with their jobs, further analysis is required to understand if this sample is reflective of the true population.

# Question 2(a)

The relationship between hourly rate and the numbers of hours worked is a weak negative relationship, indicating a slight reduction in hourly rate the more hours an employee works. From the sample data provided, when broken down by the number of hours worked and the average hourly rate, what I found was there those who worked 34 hours a week earn an average of $66.30 an hour and those who work 55 hours a week, they only earn an average of $65.21 an hour.

There is a weak positive relationship between the hourly rate and the number of years worked indicating a very slight increase in hourly rate the longer the employee has been employed with the company. From the sample provided, I found the average hourly rate for staff employed less than 5 years to be $66.19, and the average hourly rate for staff employed more than 35 years is $92.83. Although this may on first instance seem like a wide range of approximately $26 an hour in difference, the number of years between these two cohorts are large, so when factoring the number of years, the increase in hourly rate is not that significant, which is reflective of my findings that there is a weak positive relationship between these two variables.

There is almost no relationship between the number of years employed and the number of hours of worked, as from the analysis, we have found it to be an extremely weak negative relationship, but the value is so small that this can be interpreted that there is no relationship. From the sample data, an employee who has been employed for less than 5 years worked a total of 41.32 hours on average, whereas an employee on the higher end of employment length of more than 35 years with the company, these employees on average worked a total of 39.75 hours, so there is an extremely small variance between the short term and longer-term employees. However, do note from the analysis, I found an unusual spike in average hours worked for employees who have been employed between 30-34 years, this cohort had an average hour of 45.62 hours per week and needs further investigation as these could be outliers.

# Question 2(b)

One would assume that more overtime required would lead to higher attrition rates. From my analysis, while I found this to be true, the relationship is not a strong one, but a weak positive relationship.

From the sample data provided, I found was that of those required to work overtime has seen higher attrition rates than those not required to work overtime. The cohort that worked overtime had an attrition rate of 30.53%, compared to 10.44% attrition rate for the cohort not required to work overtime. There is a difference of about 20% attrition rates between these two groups which is an enormous difference, however there are other factors contributing to this, maybe lower hourly rates that needs further investigating.

I also analysed the results of employees who are no longer employed by the company separately to see the splits between employees who worked overtime and those that did not work overtime. Of the 237 employees who have been flagged as “Yes” under attrition, there is an almost equal split between those that worked overtime (54%) and those that did not work overtime (46%). Further analysis is required here to understand if the same can be seen across the population, as these are only results from the sample data provided.

# Question 2(c)

From my analysis, I have found there to be an extremely weak negative relationship between work life balance rating and age, from the sample data, it is safe to say that age does not affect the work life balance rating. I drilled down further to see if there are differences in average age between the four rating groups, and what I found was that for all groups, the average age is quite similar around 36 to 37 years old. This can also be due to the distribution of age in the sample data provided to be clustering around the 30 to 40 years old. In the sample data provided, I found that over 50% of employees have rated work life balance as Better (60.75%).

# Question 3(a)

From the sample data set, the average travel time seen by employees is about 29 minutes, (28.91 mins). 50% of employees have been seen to have travel times less than 25.5 minutes. In the sample, we found 90 minutes to be the longest travel time, and 18 minutes to be the shortest travel time, which is a difference about 72 minutes, indicating large variations. The most common travel time is 19 minutes. The middle 50% of employees has travel times between 20 to 35 minutes.

Based on the sample of 1470 employees, I am 95% confident that the true average travel time for all employees is between 28.33 minutes to 29.50 minutes. Do note that there are outliers in the sample data that needs further investigation.

# Question 3(b)

From the sample analysed, the rating that received the most votes were high relationship satisfaction (31.22%) followed by very high (29.39%), followed by medium (20.61%) and low (18.78%). The total sample percentage of employees who rated as medium or low is 39.39%.

Based on a sample of 1470 responses, I am 95% confident that the true proportion of employees who rate relationship satisfaction as either medium or low satisfaction is between the range of 36.89% to 41.89% of employees, we can observe that the sample percentage is within this range.

# Question 4(a)

In the sample provided, the average hourly rate sits at $69.38, 50% of employees are earning $69.50 an hour or more and 50% of employees are earning below $69.50. The most common hourly rate seen is $49.50. From the sample, there is a range of $95.60 between the lowest hourly rate ($26.40), and the highest hourly rate ($122). There is also a spread of $20.84 from the average hourly rate.

The middle 50% of employees are seeing a range of hourly rate of between $52.25 to $87.28. And the top 10% of employees are earning $97.50 or more an hour.

Using the information above from the sample, I ran some tests to understand if these figures are reflective of the overall employees’ hourly rates. Based on a sample of 1470 employees, at 5% significance level, there is insufficient evidence to conclude that true average hourly rate for employees is more than $70.

# Question 4(b)

There was a total of 30.34% employees who rated very high in environment satisfaction scores, 30.82% rated as high, 19.52% rated as medium and 19.32% rated as low environment satisfaction in the sample. So overall, from the sample there was a total of 61.16% of employees who rated very high and high, this indicates that there is a good working environment provided to employees.

From my testing to see if more than 70% of all employees have rated as either very high or high, what I found was that based on a sample of 1470, with a 5% significance level, there is sufficient evidence to conclude that the true proportion of employees is below 70%. I am 95% confident that the true proportion of employees who rate as either very high or high is between 58.66% to 63.65% of employees.

# Question 5

To work out the minimum number of survey responses required to estimate average hours worked and employee attrition, I had to analyse the sample response for both these variables separately using 90%, 95% and 99% confidence levels, to accurately gauge the average hours worked at 90%, you will only need a minimum of 511 responses, this goes up to 726 for 95% confidence and with 99% confidence, you will need a minimum of 1253 responses. Across all confidence levels, my analysis for attrition showed that you need more samples compared to average hours worked, so we will need to use these figures to accurately gauge the views across both variables. For attrition, at 90% confidence, you will need a total of 1083 responses, 95% confidence will bring it up to 1537 responses and 99% confidence you will need many responses amounting to 2654.

Based on this information, I believe achieving 99% confidence is not necessary in most cases, and 95% confidence is generally used in deriving overall population insights from a survey, so I would suggest that for the next survey, we should aim to collect 1537 responses. This is a slight increase from the 1470 that was provided to analyse the findings in this report, and I appreciate that both financial and non-financial costs need to be factored in, thus even dropping down to 90% confidence with 1083 responses should give us a good picture of the total population views but will not be as accurate as the 95% confidence.

# Conclusion

To conclude, I have found that on average most employees are receiving annual salary increases of 4.48%, however this figure reduces the longer the employee has been employed by Globex. This is also supported by my findings of the weak positive relationship between hourly rate and years employed. Perhaps, this is something that should be reviewed to improve retention in longer term staff to ensure that the wealth of knowledge with these staff is not lost to a competitor.

From the sample, more than half (61.29%) of employees have rated job satisfaction as high or very high, and over 70% (71.16%) of employees rated work life balance as better or best. I’ve also found that from the sample, over 60% (60.61%) have rated relationship satisfaction as high and very high, and with 95% confidence can estimate that the true proportion would lie somewhere between 58.11% to 63.11%. All these ratings indicate that overall, within the company there is a good working culture and employees are generally happy with their jobs.

Further analysis is required to understand what the drivers of staff attrition are as from my analysis, overtime and attrition only has a weak positive relationship, so I do believe that there are other factors that come to play with regards to attrition. I would recommend further analysis around the relationship between attrition, training events last year and hourly rate to see if these could be drivers for attrition.

Age does not seem to have an impact on work life balance relationship, so I would recommend further analysis between work life balance and education and travel time to see if these are drivers for higher work life balance ratings.

I was unable to conclude that the average hourly rate was more than $70, however there is sufficient evidence to conclude that less than 70% of employees are happy with their work environment and can confidently estimate that only 58.66% to 63.65% of employees will rate work environment as high or very high.