#### **Option #2: Call Times**

Call International oversees the quality of 200 call centers throughout the world. They want to determine how the centers compare among four variables for the most recent year:

YOU HAVE TO SUBMIT IT AS A WORD DOCUMENT AND RUN IT THROUGH TURN IT IN.

YOU HAVE TO FOLLOW APA FORMAT. - see in google drive

YOU ALSO HAVE TO SUBMIT EXCEL SHEET.

DUE 10:59PM.

**Shift A Average Call Time** (in minutes)

**Shift B Average Call Time** (in minutes)

**Average Customer Satisfaction Level** (on a 4-point scale: 1=poor, 2=average, 3=good, 4=excellent)

**Average Number of Employees**

Data collected for the sample of 200 Call Centers are contained in the file named **Call Centers.** Be sure to use all 200 data points.

**Managerial Report**

Prepare a report (see below) using the numerical methods of descriptive statistics presented in this module to learn how the variables contribute to the success of a call center. Be sure to include the following three items in your report.

1. Calculate descriptive sample statistics (mean, median, range, the two quartiles Q1 and Q3 (using QUARTILE.EXC), minimum, maximum, interquartile range, sample standard deviation, and coefficient of variation) for each of the four variables, along with an explanation of what the descriptive statistics tell us about the call centers.

* In this case, which measure of central tendency would be best for this application? Explain why.
* Which measure of variation would be best for this application? Explain why.
* How can one use the above descriptive statistics to understand the call centers better?
* Which graphical displays of data would you use to help understand or complement the above descriptive statistics? Explain how and why. -

Note: QUARTILE.EXC works only for Excel 2010 or newer.

1. Use the z-score to determine which call centers, if any, should be considered outliers in each of the four variables.
   1. Shift A
      1. 38. Z-score of 3.04459
      2. 50. Z-score of 2.376632
      3. 89. Z-score of 2.413741
      4. 188. Z-score of 3.118808
   2. In total there are 4 outliers for Shift A. Call centers #38, #50, #89, and #188 have z-scores of 3.04459, 2.376632, 2.413741, and 3.118808 respectively. The outliers exist near or at the maximum; inspectiving both the average customer satisfaction level in addition to the average number of employees may highlight why these centers are outliers.

* If there are any outliers in any category, please list them and state for which category they are an outlier.
* How would identifying outliers be useful in this application?
* What advice might you give to call centers that are outliers?
* How else would you determine outliers?

1. Compute the sample correlation coefficient, showing the relationship between Satisfaction Level and each of the other three variables (Shift A Average Call time, Shift B Average Call Time, Average Number of Employees).

* Explain what the correlation coefficients tell us about the three pairs of relationships. Use tables, charts, or graphs to support your conclusions. - graphs.
* The correlation coefficient for the Shift A average call time and the average customer satisfaction level is 0.885985567. This indicates a strong relationship between the two variables; both increase together.
* The correlation coefficient for the Shift B average call time and the average customer satisfaction level is 0.965341049. This indicates a strong relationship between the two variables; both increase together.
* The correlation coefficient for the average number of employees and the average customer satisfaction level is 0.009987493. This is a very weak value and suggests no significant relationship exists.

Write a report that adheres to the formatting and APA expectations outlined on the [CSU Global Writing Center](https://csuglobal.libguides.com/writingcenter/apa_resources)

[(Links to an external site.)](https://csuglobal.libguides.com/writingcenter/apa_resources)

. As with all written assignments at CSU Global, you should have in-text citations and a reference page.

Submit your Excel file in addition to your report.

Requirements:

1. The paper must be written in third person.
2. Your paper should be four to five pages in length (counting the title page and references page) and cite and integrate at least one credible outside source. The [CSU Global Library](http://csuglobal.libguides.com/libraryhome)
3. [(Links to an external site.)](http://csuglobal.libguides.com/libraryhome)
4. is a great place to find resources.
5. Include a title page, introduction, body, conclusion, and a reference page.
6. The introduction should describe or summarize the topic or problem. It might discuss the importance of the topic or how it affects you or society as a whole, or it might discuss or describe the unique terminology associated with the topic.
7. The body of your paper should answer the questions posed in the problem. Explain how you approached and answered the question or solved the problem, and, for each question, show all steps involved. Be sure the Word file is in paragraph format, not numbered answers like a homework assignment.
8. The conclusion should summarize your thoughts about what you have determined from the data and your analysis, often with a broader personal or societal perspective in mind. Nothing new should be introduced in the conclusion that was not previously discussed in the body paragraphs. The conclusions should emanate (be aligned with) the findings.
9. Include any tables of data or calculations, calculated values, and/or graphs associated with this problem in the body of your assignment.
10. Document formatting, citations, and style should conform to the [CSU Global Writing Center](https://csuglobal.libguides.com/writingcenter/apa_resources)
11. [(Links to an external site.)](https://csuglobal.libguides.com/writingcenter/apa_resources)
12. . A short summary containing guidelines for paper formatting, citations, and references is contained in the [New Sample APA Paper](http://csuglobal.libguides.com/ld.php?content_id=21534702)
13. [(Links to an external site.)](http://csuglobal.libguides.com/ld.php?content_id=21534702)
14. . In addition, information in the [CSU Global Library](http://csuglobal.libguides.com/c.php?g=207676p=3601840)
15. [(Links to an external site.)](http://csuglobal.libguides.com/c.php?g=207676p=3601840)
16. has many helpful areas (Writing Center, Writing Tips, Template Examples/Papers Essays, and others).

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An explanation of what the descriptive statistics tell us about .. the call centers.

1. descriptive sample statistics (mean, median, range, the two quartiles Q1 and Q3 (using QUARTILE.EXC), minimum, maximum, interquartile range, sample standard deviation, and coefficient of variation)

**Shift A Average Call Time**

1. (mean, median, range, the two quartiles Q1 and Q3 (using QUARTILE.EXC), minimum, maximum, interquartile range, sample standard deviation, and coefficient of variation

The most frequent call time for Shift A was 10 minutes. A quarter of the calls did

not exceed the mode. On average a customer was on a call with a representative for approximately 34 minutes. Fifty percent of the calls never went above an hour. However, the spread of the data ranged from a one-minute call all the way up to almost 2 hours. The maximum time of 118 minutes represents an outlier. Given the range, the median of 29 would be the best measure of central tendency for Shift A.

**Shift B Average Call Time**

**Average Customer Satisfaction Level**

The customer satisfaction feedback elicited a mean rating of 2.58 and a median rating of 3. We can expect 50% of customers to fall within the interquartile range of “average” to “excellent.” This means on average customers maintained a satisfaction level above “poor.”

**Average Number of Employees**

The average number of employees at each call center was 61.565, not too dissimilar from the median of 60. The range of employees varied noticeably; the minimum number of employees was 25 with the maximum at 100. Half of the results fall within a range of 42 to 80.75 employees. Both the minimum and the maximum fall almost near 2 standard deviations of the mean; approximately 95% of the results can be found between these metrics. Furthermore, the most frequent number is the maximum. Examining the average customer satisfaction level reported at both ends of the distribution may provide insight into the ideal number of employees at each call center.