**FINAL PROJECT**

**MILESTONE - III**

**DESCRIPTIVE STATISTICS**

**GROUP 8**

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**Analysis and Results**

**Research Question 1**

Do sales reps who work in the hardware industry and those who work in the software industry report significantly different levels of customer satisfaction?

Statistical Analysis: Independent samples t-test.

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| **Group Statistics** | | | | | |
|  | Business | N | Mean | Std. Deviation | Std. Error Mean |
| customer-satisfaction-score | Hardware | 9860 | 6.253 | 2.1450 | .0216 |
| Software | 12130 | 6.299 | 2.1776 | .0198 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Independent Samples Test | | |  |  |  |  |  |  |
|  |  | Levene's Test for Equality of Variances | | t-test for Equality of Means | | |  |  |
|  |  | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference |
|  |  |  |  |  |  |  |  |  |
| customer-satisfaction-score | Equal variances assumed | 7.797 | 0.005 | -1.595 | 21988 | 0.111 | -0.0468 | 0.0293 |
|  | Equal variances not assumed | | | -1.598 | 21201.91 | 0.11 | -0.0468 | 0.0293 |

According to the descriptive statistics for customer satisfaction scores in the hardware and software industries, hardware sales reps had a score of (M = 6.253, SD = 2.1450). Software, on the other hand, (M = 6.299, SD = 2.176). The findings showed that the null hypothesis had not been satisfied (p =.005), demonstrating that there were not equal differences between the two groups.

Customer satisfaction ratings between sales people in the hardware and software businesses did not differ statistically significantly. was found according to the t-test results (t(21,201.910) = -1.598, p =.110). The average difference in customer satisfaction scores was -0.0468, meaning that salespeople for hardware generally received worse ratings than those for software. The actual population mean difference, with a 95% confidence level, may, according to the confidence interval (-0.1042 to 0.0106), vary from a slightly better score for Hardware sales professionals to a slightly lower score. Therefore, there was no discernible difference in customer satisfaction ratings between sales agents working in the Hardware and Software industries.

**Research Question 2**

Does a sales representative's age significantly affect how much they make?

Statistical Analysis: Simple linear regression.

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| **Model Summary** | | | | |
| Model | R | R Square | Adjusted R Square | Std. The error in the Estimate |
| 1 | .264a | .070 | .070 | 21963.1293 |
| a. Predictors: (Constant), Age | | | | |

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| --- | --- | --- | --- | --- | --- | --- |
| **ANOVAa** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 794056140135.018 | 1 | 794056140135.018 | 1646.125 | .000b |
| Residual | 10606550560830.830 | 21988 | 482379050.429 |  |  |
| Total | 11400606700965.848 | 21989 |  |  |  |
| a. Dependent Variable: Salary | | | | | | |
| b. Predictors: (Constant), Age | | | | | | |

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| --- | --- | --- | --- | --- | --- | --- |
| **Coefficients** | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | 51826.351 | 558.477 |  | 92.799 | .000 |
| Age | 526.495 | 12.977 | .264 | 40.572 | .000 |
| a. Dependent Variable: Salary | | | | | | |

With an R2=0.070, the regression model demonstrates a positive association between age and salary, with age accounting for 7% of the salary variation. The t-test, with a t=40.572, p = 0, indicating that the link between age and pay is very significant, confirms the statistical significance of the age coefficient. The finding implies that sales representatives' remuneration tends to rise as they age. The results confirm the idea that a sales representative's remuneration is greatly impacted by age.

**Research Question 3**

In terms of customer satisfaction, are there discernible differences between male and female salespeople and the products they sell?

Statistical Analysis: Independent samples t-test

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| **Group Statistics** | | | | | |
|  | Female | N | Mean | Std. Deviation | Std. Error Mean |
| customer-satisfaction-score | Male | 13567 | 6.251 | 2.1610 | .0186 |
| Female | 8423 | 6.323 | 2.1658 | .0236 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Independent Samples Test | | |  |  |  |  |  |  |
|  |  | Levene's Test for Equality of Variances | | t-test for Equality of Means | | |  |  |
|  |  | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference |
|  |  |  |  |  |  |  |  |  |
| customer-satisfaction-score | Equal variances assumed | 0.371 | 0.542 | -2.384 | 21988 | 0.017 | -0.0715 | 0.03 |
|  | Equal variances not assumed | | | -2.382 | 17823.03 | 0.017 | -0.0715 | 0.03 |

The average customer satisfaction for male sales agents is 6.251, SD = 2.1610, according to the group statistics. In contrast, female sales reps score 6.323 on average for customer satisfaction, with a standard deviation of 2.1658. According to the t-test, there is a gender-based difference in customer satisfaction scores that is statistically significant (t () = -2.384, p = 0.017). This finding suggests that gender differences exist in the average customer satisfaction levels. In conclusion, female sales agents slightly outperform their male counterparts in terms of customer satisfaction.

**Research Question 4**

Does a sales representative's pay depend on their degree?

Statistical Analysis: Independent samples t-test

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| --- | --- | --- | --- | --- | --- |
| **Group Statistics** | | | | | |
|  | College | N | Mean | Std. Deviation | Std. Error Mean |
| Salary | No | 4470 | 64220.268 | 19250.6723 | 287.9335 |
| Yes | 17520 | 76085.719 | 22969.5726 | 173.5345 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Independent Samples Test | | |  |  |  |  |  |  |
|  |  | Levene's Test for Equality of Variances | | t-test for Equality of Means | | |  |  |
|  |  | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference |
|  |  |  |  |  |  |  |  |  |
| Salary | Equal variances assumed | 163.881 | 0 | -31.804 | 21988 | 0 | -11865.5 | 373.0752 |
|  | Equal variances not assumed | | | -35.294 | 8034.803 | 0 | -11865.5 | 336.1843 |

According to the findings of the statistical investigation, sales agents with college degrees are paid much more than those without degrees. In order to compare the mean salaries of sales representatives with college degrees and those without, The independent sample t-test was used. The average income for sales representatives without college degrees, according to the group figures, is $64,220.268, with a standard deviation of $19,250.6723. While the standard deviation for sales representatives with college degrees is $22,969.5726 and the mean wage is $76,085.719, respectively. With a t-value of -35.294 and a p-value of 0.000 (two-tailed), the t-test assuming unequal variances reveals a substantial salary gap between sales agents with and without college degrees. This finding indicates that the mean earnings of these two groups varied significantly. The mean wage gap is additionally anticipated to be -$11,865.4507, with a standard error of $336.1843. The conclusion that sales representatives with college degrees earn much more money than those without degrees is further supported by the fact that the 95% confidence interval of the difference (-$12,524.4592 to -$11,206.4423) does not include zero.

**Research Question 5**

Is it possible to forecast customer satisfaction levels using years of experience?

Statistical Analysis: Analysis of covariance

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| **Model Summary** | | | | |
| Model | R | R Square | Adjusted R Square | Std. The error in the Estimate |
| 1 | .203a | .041 | .041 | 2.1180 |
| a. Predictors: (Constant), Years | | | | |

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| --- | --- | --- | --- | --- | --- | --- |
| **ANOVAa** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 4245.075 | 1 | 4245.075 | 946.286 | .000b |
| Residual | 98639.008 | 21988 | 4.486 |  |  |
| Total | 102884.083 | 21989 |  |  |  |
| a. Dependent Variable: customer-satisfaction-score | | | | | | |
| b. Predictors: (Constant), Years | | | | | | |

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| --- | --- | --- | --- | --- | --- | --- |
| **Coefficients** | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | 5.801 | .021 |  | 274.935 | .000 |
| Years | .181 | .006 | .203 | 30.762 | .000 |
| a. Dependent Variable: customer-satisfaction-score | | | | | | |

According to the statistical analysis, years of experience become a potential indicator of client satisfaction levels. The study investigated the relationship between experience and customer satisfaction scores by using linear regression, maintaining all other variables constant. According to the model summary, the R-squared value of 0.041 shows that experience levels account for 4.1% of the variation in customer satisfaction. This emphasizes how important experience is in determining consumer pleasure. The relevance of the regression model is further supported by the ANOVA findings, which show a significant F-value of 946.286 (p 0.001) and a regression total and mean square of 4245.075. These statistics highlight the significant improvement in customer satisfaction score prediction when years of expertise are taken into account.

The coefficient table demonstrates that the constant term (intercept) is 5.801, reflecting the projected customer satisfaction score when the years of experience are zero (which is not practically significant in this case). The anticipated score for customer satisfaction grows by 0.181 units for each additional year of experience over the original amount, according to the coefficient for years of experience, which is 0.181. The t-test, which has a t-value of 30.762 and a p-value of 0.001, confirms the years of experience coefficient's statistical significance. This result shows a very strong correlation between years of experience and customer satisfaction ratings.

**Research Question 6**

Do salespeople with varied amounts of credentials have varying levels of customer satisfaction?

Statistical Analysis: One-way ANOVA

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| --- | --- | --- | --- | --- | --- |
| **ANOVA** | | | | | |
| customer-satisfaction-score | | | | | |
|  | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 21393.272 | 6 | 3565.545 | 961.843 | .000 |
| Within Groups | 81490.811 | 21983 | 3.707 |  |  |
| Total | 102884.083 | 21989 |  |  |  |

The findings of the statistical research show that sales agents with various numbers of credentials have significantly different customer approval ratings. A one-way ANOVA was used to compare the average customer satisfaction ratings for the various certificate groups. The high F-value of 961.843 (p 0.001) that was achieved demonstrates the statistical significance of the differences between the groups according to the ANOVA results. This finding implies that sales representatives' customer satisfaction ratings are greatly impacted by the number of credentials they possess.The findings regarding differences include: The mean customer satisfaction scores of sales representatives with no certifications (-.5337) are significantly lower than those with one diploma (.5337) and two certificates (-1.1840), and so on for subsequent certificate categories. The mean customer satisfaction scores of sales professionals with one credential (.5337) are significantly higher than those with two certificates (-.6503), three certificates (-1.2361), and so on. The mean customer satisfaction scores of sales professionals with five qualifications (-2.9756) are significantly worse than those with six credentials (-3.4001). The statistical research concludes that sales professionals with various numbers of credentials have significantly different customer satisfaction ratings. The particular mean differences vary depending on the certificate group comparison pairs. The findings show a correlation between possessing more credentials and higher customer satisfaction ratings.

**Research Question 7**

Does the feedback given to sales representatives have a significant relationship with their years of experience?

Statistical Analysis: Simple linear regression

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| --- | --- | --- | --- | --- |
| **Model Summary** | | | | |
| Model | R | R Square | Adjusted R Square | Std. The error in the Estimate |
| 1 | .002a | .000 | .000 | .83679 |
| a. Predictors: (Constant), Years | | | | |

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| --- | --- | --- | --- | --- | --- | --- |
| **ANOVAa** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | .047 | 1 | .047 | .068 | .795b |
| Residual | 15396.310 | 21988 | .700 |  |  |
| Total | 15396.358 | 21989 |  |  |  |
| a. Dependent Variable: Feedback | | | | | | |
| b. Predictors: (Constant), Years | | | | | | |

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| --- | --- | --- | --- | --- | --- | --- |
| **Coefficients** | | | | | | |
|  | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | 2.663 | .008 |  | 319.464 | .000 |
| Years | .001 | .002 | .002 | .260 | .795 |
| a. Dependent Variable: Feedback | | | | | | |

According to the findings of the statistical research, there is no connection between the feedback provided to sales people and the length of their tenure. The association between years of experience and feedback was studied using a simple linear regression model and correlation analysis. The model has an R-squared value of 0.000, this suggests that years of experience only marginally account for the variety of feedback provided to sales representatives, according to the model description. The regression model's insignificance is demonstrated by the ANOVA findings, which have an F-value of 0.068 (p = 0.795), a regression sum of squares of 0.047, and a mean square of 0.047. This result implies that incorporating years of experience as a predictor does not considerably enhance the prediction of feedback provided to sales people. The coefficient table shows that the constant term (intercept) is 2.663, which represents the estimated feedback when the years of experience are zero (which is not practically significant in this situation). Years of experience have a 0.001 coefficient, meaning that for every extra year of experience beyond the starting amount, the anticipated feedback only increases by 0.001 units.

The statistical significance of the years of experience coefficient is not supported by the t-test, which has a t-value of 0.260 and a p-value of 0.795. As a result, according to the statistical analysis, there is no meaningful relationship between the years of experience and the feedback given to sales staff. In other words, the feedback provided to sales people does not demonstrate any appreciable relationship with the length of their encounter.

**Research Question 8**

Does the personality of the sales agent explain any appreciable variance in the levels of client satisfaction?

Statistical Analysis: ANOVA

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| --- | --- | --- | --- | --- |
| **Model Summary** | | | | |
| Model | R | R Square | Adjusted R Square | StdThe error of the Estimate |
| 1 | .002a | .000 | .000 | .83679 |
| a. Predictors: (Constant), Years | | | | |

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| --- | --- | --- | --- | --- | --- |
| **ANOVA** | | | | | |
| customer-satisfaction-score | | | | | |
|  | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 15190.386 | 3 | 5063.462 | 1269.479 | .000 |
| Within Groups | 87693.697 | 21986 | 3.989 |  |  |
| Total | 102884.083 | 21989 |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Multiple Comparisons** | | | | | | |
| Dependent Variable: customer-satisfaction-score | | | | | | |
| Tukey HSD | | | | | | |
| (I) Personality | (J) Personality | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
| Lower Bound | Upper Bound |
| 1.0 | 2.0 | -1.8667\* | .0448 | .000 | -1.982 | -1.752 |
| 3.0 | -1.8515\* | .0446 | .000 | -1.966 | -1.737 |
| 4.0 | .0230 | .0521 | .971 | -.111 | .157 |
| 2.0 | 1.0 | 1.8667\* | .0448 | .000 | 1.752 | 1.982 |
| 3.0 | .0151 | .0315 | .964 | -.066 | .096 |
| 4.0 | 1.8896\* | .0415 | .000 | 1.783 | 1.996 |
| 3.0 | 1.0 | 1.8515\* | .0446 | .000 | 1.737 | 1.966 |
| 2.0 | -.0151 | .0315 | .964 | -.096 | .066 |
| 4.0 | 1.8745\* | .0413 | .000 | 1.769 | 1.980 |
| 4.0 | 1.0 | -.0230 | .0521 | .971 | -.157 | .111 |
| 2.0 | -1.8896\* | .0415 | .000 | -1.996 | -1.783 |
| 3.0 | -1.8745\* | .0413 | .000 | -1.980 | -1.769 |
| \*. The mean difference is significant at the 0.05 level. | | | | | | |

The statistical analysis's findings indicate there may be a noticeable difference between the levels of customer satisfaction obtained by various sales people with diverse personalities. The association between salespeople's typical personalities and customer satisfaction levels was investigated using multiple regression or correlation analysis. According to the model summary, personality characteristics don't account for nearly any of the variation in customer satisfaction ratings, giving the model a pathetic R-squared value of 0.000. A significant F-value of 1269.479 (p 0.001) in the ANOVA findings indicates that the differences across personality groups are statistically significant. This finding reveals that customer satisfaction scores are significantly influenced by the personality of sales representatives.

Average differences between multiple pairs of personality groupings are shown by the post hoc analysis. In comparison to personality groups 2 and 3, personality group 1 (-1.8667) has lower average ratings for customer satisfaction. There is no discernible difference between personality group 4 (0.0230) and the other groups. Average customer satisfaction scores for personality group 2 (1.8667) are greater than those for personality group 4 (1.8896). Average customer satisfaction scores for personality group 3 are greater than for group 4 (1.8745). In conclusion, the personality of the sales agent contributes to a legitimate variation in average customer satisfaction levels.