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MIDTERM PROJECT

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INTRODUCTION

Surveys at workplace play a vital role in giving you a detailed picture and a crucial feedback of those in your employ to the benefit of your company, working environment, employees and bottom line. As a Consultant to the US Federal Government, I had to help the Office of Personnel Management better understand survey data on Federal employees for the year 2017. This survey data was taken from The Federal Employee Viewpoint Survey (FEVS) that allows government employees to share their opinions about what matters most to them, and gives them the opportunity to let their leadership know how they feel about their jobs, their supervisors, and their agencies. The objective of this report is to analyze the factors affecting employee satisfaction in federal agencies.

To work with my analysis, I referred to the PRDF codebook and Government Management report. I observed that, the main focus was Employee Engagement and the New Inclusion Quotient (New IQ), with highlights of notable agency achievements.

Employee Engagement Index:

The Employee Engagement Index (EEI) is a measure of an agency's work environment — the conditions that lead to engagement. The Engagement Index is comprised of the following subfactors and items:

- Leaders Lead: Reflects the employees' perceptions of the integrity of leadership, as well as leadership behaviors such as communication and workforce motivation.

- Supervisors: Reflects the interpersonal relationship between worker and supervisor, including trust, respect, and support
- Intrinsic Work Experience: Reflects the employees' feelings of motivation and competency relating to their roles in the workplace.

New Inclusion Quotient (The New IQ):

The New IQ is built on the concept that individual behaviors, repeated over time, form habits that create an inclusive work environment. The New IQ consists of 20 questions grouped into 5 Habits of Inclusion:

- Fair: Are all employees treated equitably?
- Open: Does management support diversity in all ways?
- Cooperative: Does management encourage communication and collaboration?
- Supportive: Do supervisors value employees?
- Empowering: Do employees have the resources and support needed to excel?

Along with these two indices, I have further defined few more indices in the Data Description section that would help improve my analysis.

So, this report will help the reader understand my observations and conclusions on the basis of Data Description, Descriptive Analysis and Evaluated Models and Results for factors affecting job satisfaction.

DATA DESCRIPTION

The data consists of 71 Survey questions responses, Demographic information (Sex, Education level, Federal Tenure, Supervisory Status, Minority Status, Planning to leave), Work unit (where someone works- Agency and Level-1).

When the data was imported as a CSV file, it was pretty heavy and messy. It contained 486105 rows and 80 variables along with some blank values, missing value indicators (NA) and unknown response values (X). While NAs are generally removed, it was necessary to deal with X too because all the responses were important to calculate and compare in the processes ahead.

The structure seemed fine as it contained factors and integers. However, they would be further needed to be converted for other operations.

Data cleaning procedure

To remove NAs, I first checked their percentage proportion with respect to the total values for each column. Most of the values were either 0% or around 4%, which was very less. To deal with the missing values and X, I replaced them with NA and checked the proportions again. It was observed that the demographics had NAs in the range of 15%-19% and some of the questions had them in the range of 0%-12%. If any data has NA values more than 40%, removing them won't be a good option. Since, that wasn't the case with this data, I dropped the columns with NA values by Data Wrangling.

This process was followed by dropping the last column “POSTWT” as it was not needed in this analysis. Plus, I dropped the columns that had agency names “XX”. These were all other agencies. Since the agencies were defined as per their sizes and a lot of analysis had been worked on as per the agency’s size, it was wise to remove “XX”.

Variable selection/creation choices

Dependent Variable: To compare other variables for observing the influence of job satisfaction, a new Variable OS (Overall Satisfaction) was defined. As per the PRDF codebook, Q63-71 corresponded to “My Satisfaction”. So, I took the average of these question responses and rounded to create a new variable ‘OS’; as those questions were mostly positive and would define the satisfaction of the employee.

Independent Variables:

Agency Type Recoding: The agencies have been classified on the basis of their sizes. Using the codebook reference, I recoded the the variable Agency to a new variable “AgencyType” which had categories on the basis of number of employees: Small (100-999), Medium (1000-9999), Large (10000-74999), Very Large (>75000).

Agencyqes: With the help of questions related to Work place unit and agency in the survey, I made a new variable “agencyqes” with the average of Q29-41. Because, I figured out that agency can play a major role for an employee.

To use the EEI, NewIQ in the analysis, new columns were defined with the help of questions in the survey (defined in the Introduction).

EEI: It was calculated as the average of three entities :

- EE1 (Leaders Lead): Mean of (Q. 53, 54, 56, 60, and 61)
- EE2 (Supervisors): Mean of (Q. 47, 48, 49, 51, and 52)
- EE3 (Intrinsic Work Experience): Mean of (Q. 3, 4, 6, 11, and 12)

NewIQ: It was calculated as an average of the following entities:

- IQFair (Fair): Mean of (Q. 23, 24, 25, 37, and 38)
- IQOpen (Open): Mean of (Q. 32, 34, 45, and 55)
- IQCooperative (Cooperative): Mean of (Q. 58 and 59)
- IQSupportive (Supportive): Mean of (Q. 42, 46, 48, 49, and 50)
- IQEmpowering (Empowering): Mean of (Q. 2, 3, 11, and 30)

Top Positive Response Index (TPRI): Items or areas employees rated as most positive and those items or areas where employees feel improvements are needed. Calculated as average of (Q. 7, 8, 13, 12, 5, 16, 28, 49, 6, 42)

Sampling: Since the data is very heavy, it is better to take a sample. I took a random sample of 30% of the data at seed 462. This sample-FEV4Sample was further used for analysis.

In this way, I made my data ready for further processing.

DESCRIPTIVE ANALYSIS

Univariate Analysis: After plotting on a univariate level, following results were obtained.

- OS: Normalised and left skewed with -0.14 kurtosis, mean= 3.56. After applying power transform, it suggested a power of 1.5. The transformation gave a little better result.
- EEI: Left skewed with Mean of 3.88. Implies that conditions that lead to engagement was almost towards 4 on a scale of 5, showing a positive engagement at workplace.
- NewIQ: Left skewed with mean of 3.74. Implies that the work environment was on an average 3.74/5, which is an average thing.
- TPRI: Highly left skewed with a mean of 4.31
- Agency Type: Very large agencies participated the most in the survey.
- Agency qes: Most of the employees agreed (Mean=4) that their agency was a good place to work with.

Bivariate analysis

Numeric variables: After plotting two numeric variable and correlation testing with each other, following results were obtained:

- EEI~OS: The regression line showed a linear positive relation between Overall Satisfaction and EEI with a cor of 88.3%. This means with more EEI, there was

more satisfaction.

- New IQ~OS: The regression line showed a linear positive relation between OS and EEI with a cor of 86.94%. This means with more New IQ, there was more satisfaction.
- TPRI~OS: The regression line showed a linear positive relation between OS and EEI with a cor of 73.54%. However it was not that linear compared to previous plots.

After observing the corrplot, EEI and NewIQ had the highest correlation of 93%.

Factor and numeric variables: After plotting one factor and numeric variable with each other and performing ANOVA test, the following was observed:

- Demographics~OS: The employees beyond Bachelor's degree, more than 20 years with the Federal Government, Supervisor/ Manager/Senior Leader, those who didn't consider leaving the organisation were the ones who were more satisfied and had significant ANOVA codes. Whereas, Sex and Minority didn't show significant results.
- Agency type~OS: Employees working in Large agencies were most satisfied compared to other agency types.

EVALUATED MODELS AND RESULTS

With the help of previous results and observations the regression models were made. I started with a model that considered OS with respect to EEI and New IQ, which summarised with an R squared value of 79.52%. Further adding variables, I observed that DEDUC, DSEX, AgencyType made no difference in the model at all, while, DSUPER, TPRI, DEFEDTEN showed a little improvement in descending order. And, Agencyqes made a significant positive difference in improvement. To further improvise, I tried removing outliers, but it did not show any improvement.

I also applied the concept of Interactions which is used when we suspect that the effect of a predictor might vary at different values (levels). This means, that the relationships between an Independent Variable and the Dependant Variable is dependent on the value of another Independent Variable. I tried the interaction between Agencytype and agencyqes, and it didn't seem to show any difference.

Along with this, referencing was used to relevel various factors like AgencyType, DEDUC, DSUPER to check if they would improve the model analysis. However, the value remained same to 82.46%.

So, I adhered to the 9th model which showed an adjusted R squared value of 82.45%.

CONCLUSION

While most of the demographics and agency size didn't make any difference, Supervisory status and TPRI made a positive little difference.

So, after a rigorous analysis and observations, I conclude that Employee Engagement Index, New Inclusion Quotient and the responses related to work unit that most employees agreed (creativity, innovation, personal empowerment, protection, accomplishing missions etc) are the most important factors for the job satisfaction of an employee. This can be followed by one's position as employees with higher positions were more satisfied. And also the TPRI, which revolved around extra efforts, work done, results, showing that employees willing to work harder were more satisfied.

Hence, I would like to suggest the US Federal Government to incorporate in these factors to increase the job satisfaction of their employees.

REFERENCES

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