EPPS 6323 Knowledge Mining

Research Proposal

Dohyo Jeong, Jinju Suk, and Theodore Oswald Chau

1. Research Topic

This study aims to develop a machine learning model that can classify and predict public employees' job satisfaction. This development would also involve comparison of the factors that significantly influence said classification and prediction. This research would likely hold significant implications for management of public employees' job satisfaction, which can directly impact a workers' job efficiency, organizational loyalty, and ability to facilitate a positive professional atmosphere. As such, accurate identification and prediction of factors that enhance job satisfaction among public employees is crucial. By utilizing machine learning models to classify and predict these factors, government agencies can establish more effective personnel policies and take necessary measures to improve their overall working environments.

2. Research Questions

Question 1. Differentiation of group characteristics between public employees and executive-level public employees:

This research question explores the variation among individuals within the same job type, those being executive-level employees and non-executive level employees. By clearly distinguishing the variations among each group, organizations can explore more individualized improvement strategies. For example, since executive-level public employees are more involved in policy-making processes, the factors affecting their job satisfaction may differ from those of other, lower level public employees. Understanding these differences can enable the development of policies that better meet employee needs and expectations organizationally.

Question 2. Changes in factors affecting job satisfaction before and after the pandemic:

The COVID-19 pandemic significantly affected how work environments function on a worldwide scale. This research question analyzes how factors affecting public employees' job satisfaction changed post-pandemic. Insights gained from pre-pandemic and post-pandemic analysis can provide vital guidelines for government agencies in how to respond to crises.

Additionally, this research can help develop strategies to maintain employee satisfaction and well-being in similar future unexpected situations.

Question 3. Differences in factors affecting job satisfaction between different ranks:

This research question explores how job satisfaction factors differ when directly comparing non-executive and executive public employees. Understanding these differences can allow organizations to develop customized personnel management strategies for different professional positions. For instance, executive employees may require opportunities for leadership development, whereas general public employees may need policies that focus more on work-life balance. Such tailored approaches can contribute to enhancing overall organizational satisfaction and efficiency.

This study aims to understand better and predict the factors influencing public employees' job satisfaction, providing a practical foundation for effective personnel policies and workplace improvements. Ultimately, this could lead to enhanced work efficiency among public employees and improvements in the quality of public services.

3. Methodology

1) Checking the Distribution and Characteristics of Data and Factors:

- This study plans to utilize Federal Employee Viewpoint Survey (FEVS) data (2019-2020).

- This study will initially employ various graphs and descriptive statistical analysis methods to examine the distribution and characteristics of the data and its factors. This step is essential for cultivating a deeper understanding of the data, identifying its basic properties, outliers, and the characteristics of its distribution before analysis. Understanding the overall structure and patterns of the data enables establishing a more accurate modeling strategy.

2) Clustering through Unsupervised Learning (Question 1):

- Using the unsupervised learning technique of k-means clustering, this study will cluster data for non-executive and executive-level public employees respectively. By comparing the clusters that emerge from this process, we can understand the characteristics of each group and identify their differences. This can contribute to developing tailored policies for employees at various levels within the organization.

3) Classification Modeling through Supervised Learning (Question 2 & Question 3):

- The study employs supervised learning algorithms such as decision trees, random forests, and XGBoost to train classification models predicting public employees' job satisfaction. By comparing the performance of these models, we can select the model that offers the best predictive performance. Identifying significant features within each model allows us to determine the factors that substantially impact public employees' job satisfaction.
- The decision tree model identifies critical features through the decision paths and characteristics of nodes, while the random forest model allows for the analysis of feature importance to understand which characteristics play a crucial role in model predictions. Through such analysis, we can compare the changes in factors affecting job satisfaction among different public employee ranks, as well as between pre and post COVID-19 pandemic datasets.

These methodologies will enable us to systematically analyze and predict the factors influencing public employees' job satisfaction, contributing to the development of personnel policies and workplace improvements necessary for enhancing employee satisfaction and the overall quality of public services.

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Table of Contents

1 Research Topic

Human Resource Management for public officials

- Develop a machine learning model to ***classify and predict public employees' job satisfaction***.
- ***Compare factors predicting job satisfaction*** to enhance organizational management.
- Implications for improving job efficiency, loyalty, and professional atmosphere.

2 Research Questions

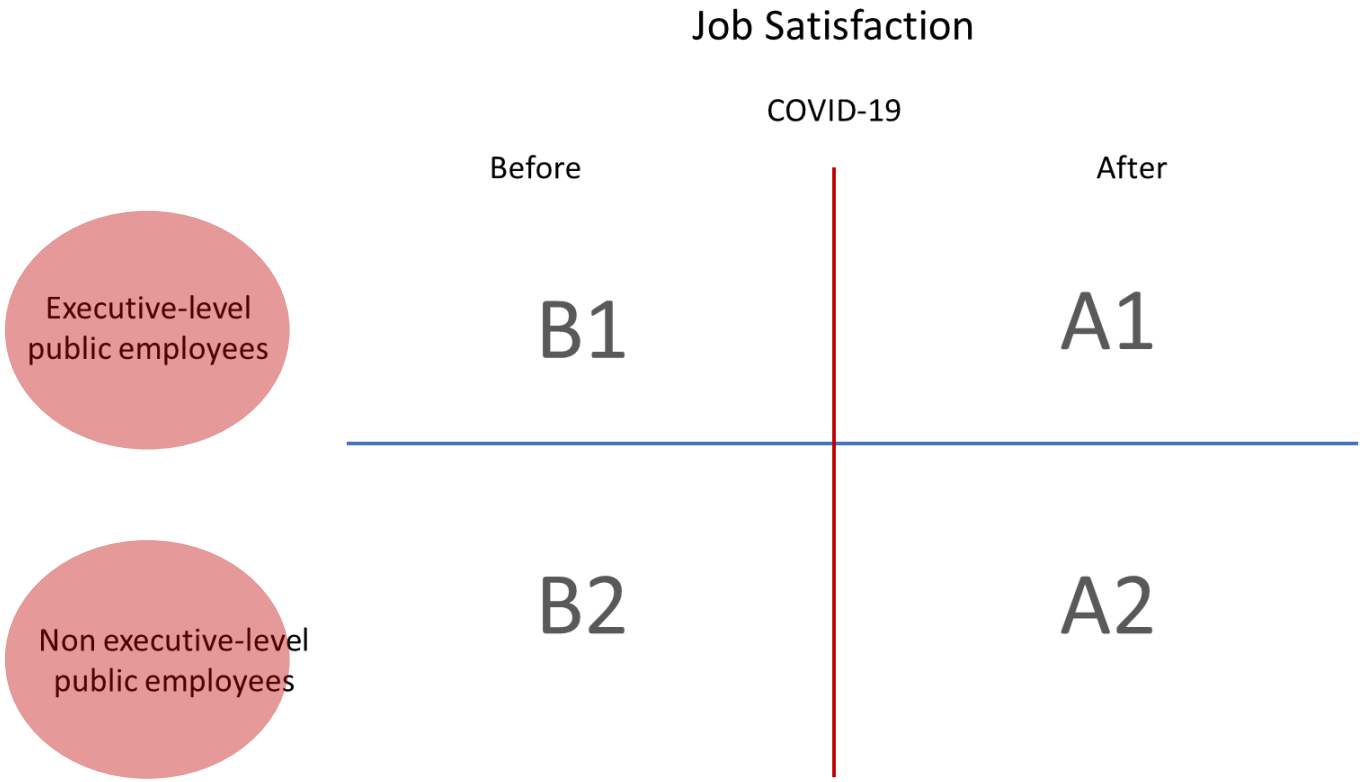
Q1. Differentiation of ***within group characteristics*** between public employees and executives.

Q2. Changes in factors affecting ***job satisfaction before and after the pandemic***.

Q3. Differences in factors affecting ***job satisfaction between different ranks***.

2 Research Questions

Q1. Differentiation of within group characteristics between public employees and executives.

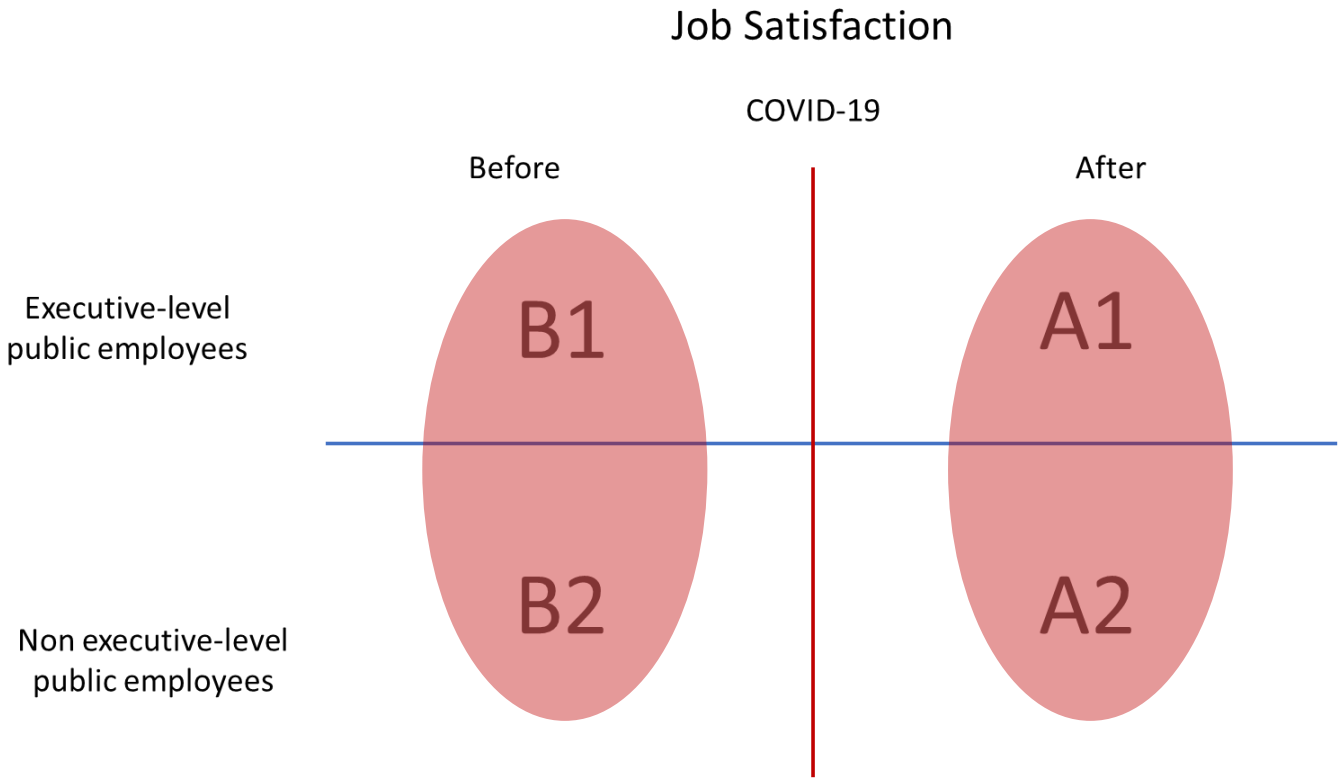


Methodology

- Clustering via unsupervised learning (k-means) for executive and non-executive employees.

2 Research Questions

Q2. Changes in factors affecting job satisfaction before and after the pandemic.

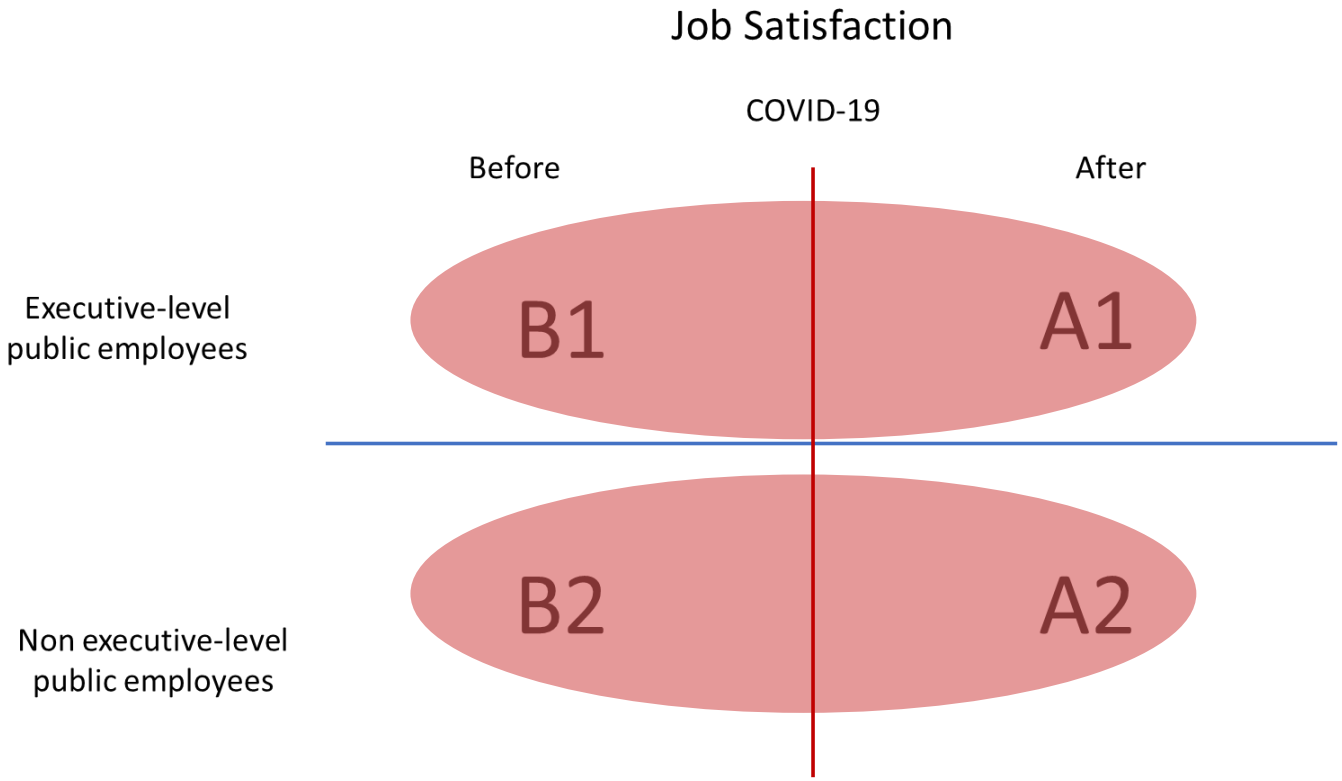


Methodology

- Classification modeling using supervised learning (decision trees, random forests, XGBoost).
- Feature importance analysis to understand factors influencing job satisfaction
- Comparison of pre and post-pandemic datasets.

2 Research Questions

Q3. Differences in factors affecting job satisfaction between different ranks.



Methodology

- Classification modeling using supervised learning (decision trees, random forests, XGBoost).
- Feature importance analysis to understand factors influencing job satisfaction
- Comparison among different employee ranks.

3 Methodology

- Federal Employee Viewpoint Survey (FEVS) data (2019-2020)
- Data distribution and characteristics analysis.
- Clustering via unsupervised learning (k-means) for executive and non-executive employees.
- Classification modeling using supervised learning
  (decision trees, random forests, XGBoost).
- Feature importance analysis to understand factors influencing job satisfaction.
- Comparison of pre and post-pandemic datasets and among different employee ranks.

4 Expectations

- Provide insights for ***effective personnel policies and workplace improvements*** to enhance public employees' satisfaction

- Enhance ***work efficiency and quality of public services***.

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THANK YOU