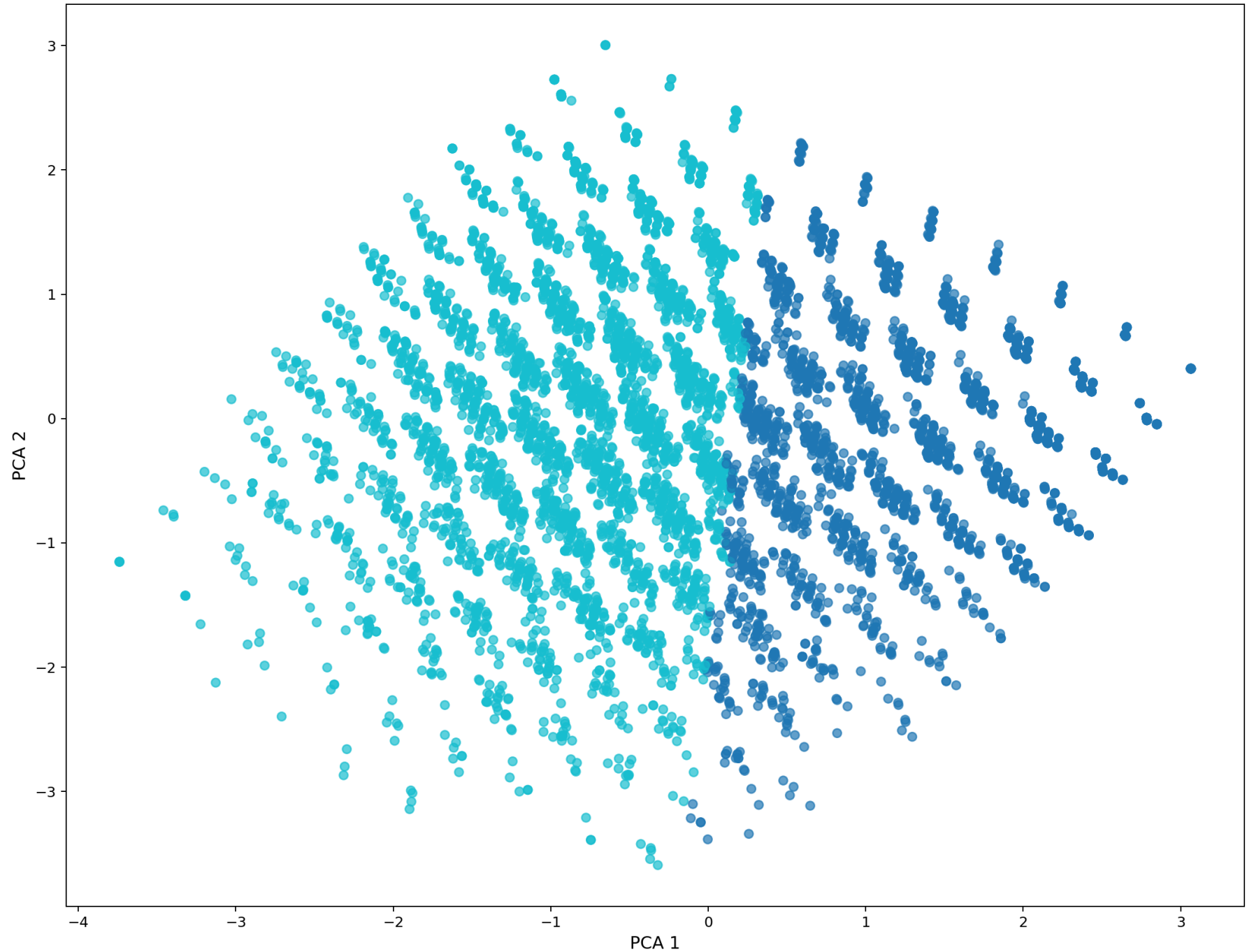# Clustering & Association Rule Mining Report

KMeans Clustering (PCA, k=2) - All Departments

Cluster Interpretation

Based on the cluster centers, we can interpret the two groups as follows:

Cluster 1: "Generally Satisfied"

This cluster represents individuals who are generally satisfied with their experience. They have a relatively high rating for most features, indicating that their objectives were met to some extent (0.38), and they were pleased with the venue (0.64), speaker (0.62), and allowance (0.63). While their schedule rating is lower (0.21), it's still not extremely negative. The facilitator and participant ratings are also relatively positive (0.32 and 0.34, respectively). Overall, this cluster suggests a group that had a largely positive experience.
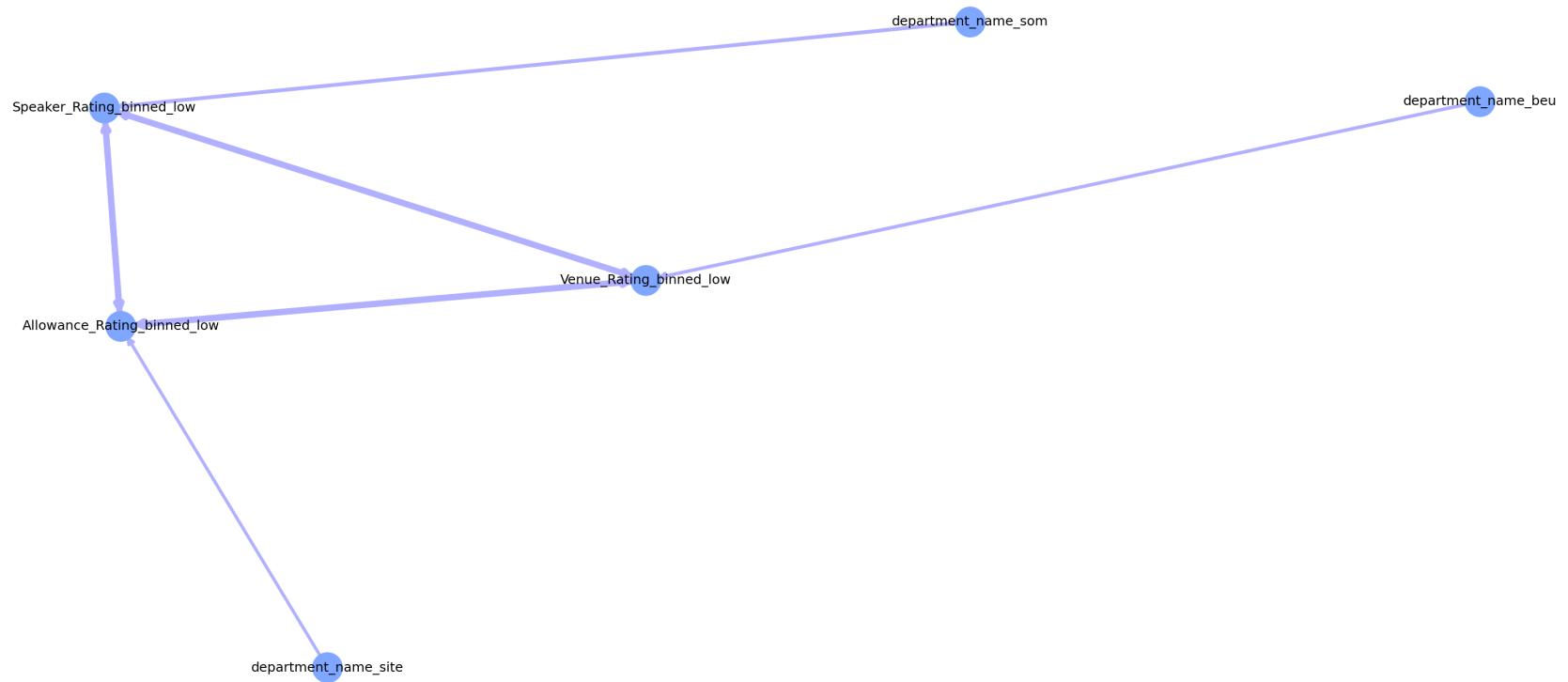
Cluster 2: "Generally Dissatisfied"

In contrast, Cluster 2 represents individuals who are generally dissatisfied with their experience. They have low ratings across all features, indicating that their objectives were not met (-0.27), and they were unhappy with the venue (-0.45), speaker (-0.43), and allowance (-0.44). The schedule rating is also negative (-0.15), although not as strongly as some of the other features. The facilitator and participant ratings are also relatively low (-0.23 and -0.24, respectively). Overall, this cluster suggests a group that had a largely negative experience.

The fact that the elbow and silhouette methods supported a choice of k=2 suggests that these two clusters are a reasonable and meaningful way to divide the data. The clear differences between the two clusters imply that there are distinct groups with different experiences and perceptions.
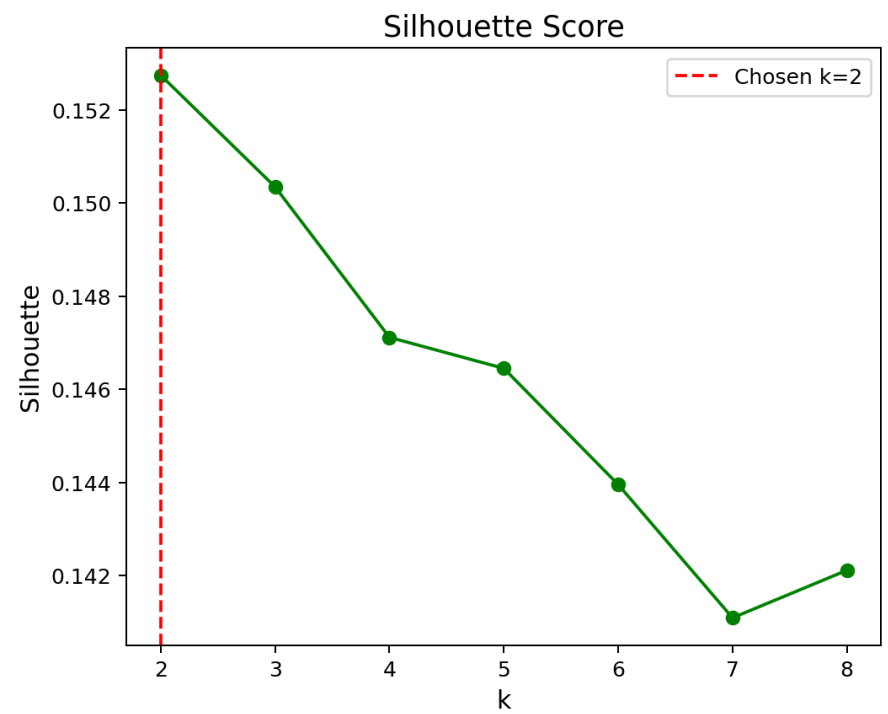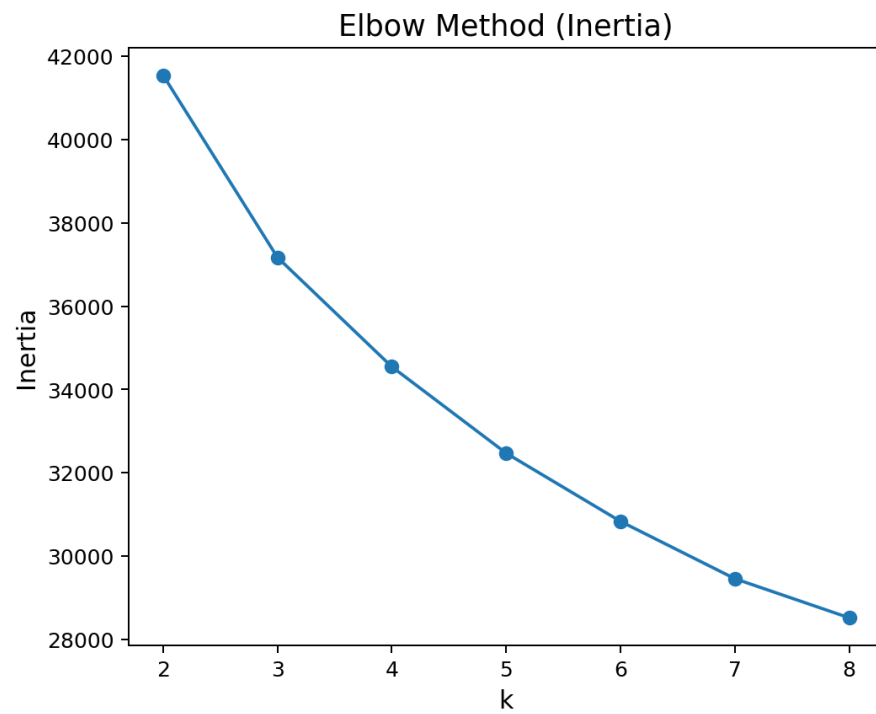
Association Rule Network (edges: rules, width: lift) - All Departments

department_name_som

department_name_beu

Speaker_Rating_binned_low

Venue_Rating_binned_low

Allowance_Rating_binned_low

department_name_site

ARM Results Table

Antecedents	Consequents	Support	Confidence	Lift
department_name_beu	Venue_Rating_binned_low	0.102	0.514	1.043
department_name_site	Allowance_Rating_binned_low	0.105	0.507	1.017
department_name_som	Speaker_Rating_binned_low	0.101	0.523	1.074
Allowance_Rating_binned_low	Venue_Rating_binned_low	0.297	0.595	1.207
Venue_Rating_binned_low	Allowance_Rating_binned_low	0.297	0.602	1.207
Speaker_Rating_binned_low	Venue_Rating_binned_low	0.285	0.584	1.184
Venue_Rating_binned_low	Speaker_Rating_binned_low	0.285	0.577	1.184
Allowance_Rating_binned_low	Speaker_Rating_binned_low	0.295	0.592	1.214
Speaker_Rating_binned_low	Allowance_Rating_binned_low	0.295	0.605	1.214
Allowance_Rating_binned_low, Speaker_Rating_binned_low	Venue_Rating_binned_low	0.186	0.632	1.281
Allowance_Rating_binned_low, Venue_Rating_binned_low	Speaker_Rating_binned_low	0.186	0.628	1.288
Speaker_Rating_binned_low, Venue_Rating_binned_low	Allowance_Rating_binned_low	0.186	0.655	1.313

Descriptive Analysis Table

Feature	Min	Max	Mean	Median	Std	Shape
Objectives_Met	0.00	3.00	1.92	2.00	1.05	left-skewed
Venue_Rating	0.00	3.00	1.49	2.00	1.12	symmetric
Schedule_Rating	0.00	3.00	1.87	2.00	1.06	symmetric
Allowance_Rating	0.00	3.00	1.50	2.00	1.14	symmetric
Speaker_Rating	0.00	3.00	1.52	2.00	1.14	symmetric
Facilitator_Rating	0.00	3.00	1.89	2.00	1.06	symmetric
Participant_Rating	0.00	3.00	1.91	2.00	1.05	left-skewed

Descriptive Analysis (Categorical)

Descriptive Analysis for: All Departments
Categorical Columns Value Counts:
department_name value counts:
department_name
SNAHS   1463
SITE   1461
BEU   1406
SBAHM   1373
SOM   1362
AI Analysis:
Insights and Trends:
1. **Objective Met**: The mean score for Objectives Met is 1.92, which is relatively high, indicating t
hat most objectives are being met. However, the left-skewed shape suggests that there are some instance
s where objectives are not being met, and efforts should be made to improve this.
2. **Ratings**: The mean scores for Venue, Schedule, Allowance, Speaker, Facilitator, and Participant r
atings are all around 1.5-1.9, indicating a generally positive experience. The symmetric shape of these
 distributions suggests that the ratings are evenly distributed, with no significant skewness.
3. **Department Distribution**: The top five departments by count are SNAHS, SITE, BEU, SBAHM, and SOM,
 with SNAHS having the highest count (1463). This suggests that these departments are more active or ha
ve more events/trainings, which could be an area for further exploration.
4. **Rating Comparison**: The Facilitator and Participant ratings are among the highest, with mean scor
es of 1.89 and 1.91, respectively. This suggests that facilitators and participants are generally satis
fied with the events/trainings. The Venue and Allowance ratings are among the lowest, with mean scores
of 1.49 and 1.50, respectively, indicating potential areas for improvement.
Actionable Recommendations:
1. **Improve Objective Met**: Conduct a root cause analysis to identify the reasons for not meeting obj
ectives in some cases. Develop strategies to address these gaps, such as providing additional resources
 or support.
2. **Enhance Venue and Allowance Experience**: Gather feedback from participants to understand the reas
ons behind the lower ratings for Venue and Allowance. Consider upgrading facilities or providing more c
omprehensive allowances to improve the overall experience.
3. **Leverage Facilitator and Participant Strengths**: Build on the strengths of facilitators and parti
cipants by providing opportunities for them to share their expertise and best practices. This could inc
lude facilitating workshops, training sessions, or mentoring programs.
4. **Departmental Analysis**: Conduct a more in-depth analysis of the top five departments (SNAHS, SITE
, BEU, SBAHM, and SOM) to understand their specific needs, challenges, and areas for improvement. This
could help identify opportunities to tailor support and resources to each department's unique requireme

nts.

5. **Monitor and Evaluate**: Regularly monitor and evaluate the effectiveness of events/trainings, usin g metrics such as the ones provided. This will help identify areas for improvement and ensure that reso urces are being allocated efficiently.

Future Research Directions:

1. **Qualitative Analysis**: Conduct interviews or focus groups to gather more in-depth, qualitative fe edback from participants, facilitators, and department representatives. This could provide richer insig hts into the strengths and weaknesses of the events/trainings.

2. **Correlation Analysis**: Investigate correlations between different ratings (e.g., Venue and Speake r ratings) to identify potential relationships and areas for improvement.

3. **Predictive Modeling**: Develop predictive models to forecast participant satisfaction and objectiv e met based on various factors, such as department, facilitator, or venue. This could help identify hig h-priority areas for improvement and optimize resource allocation.
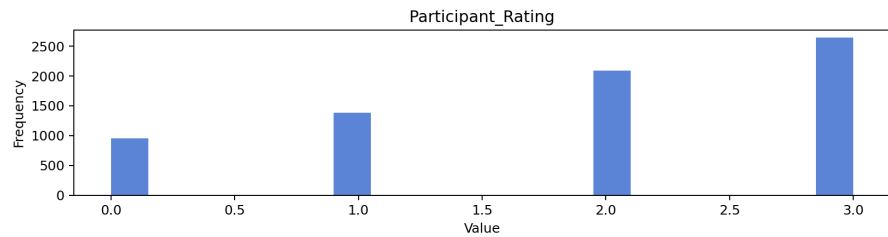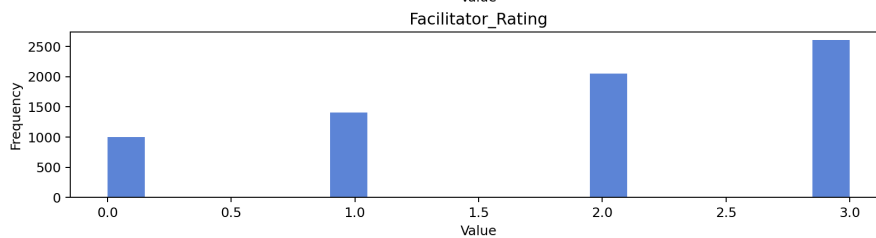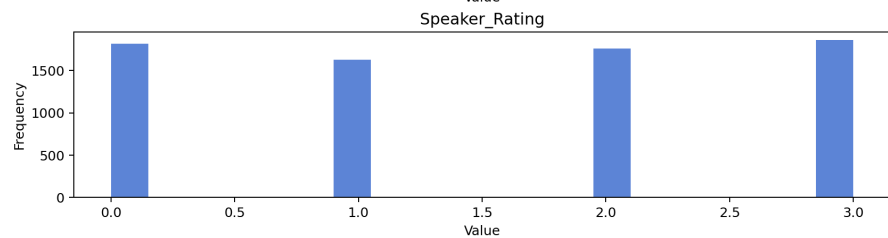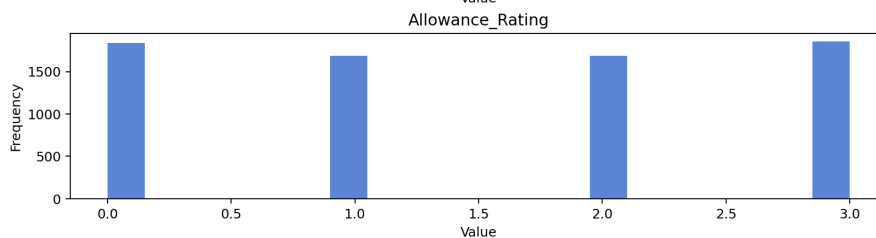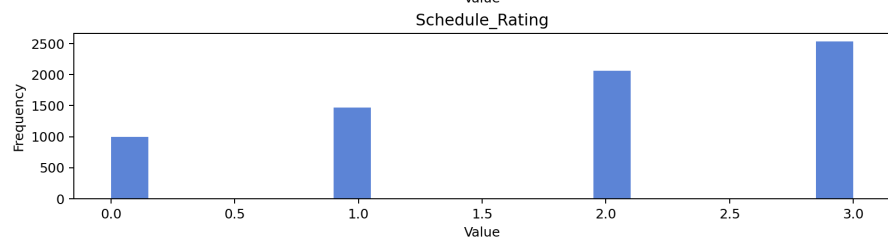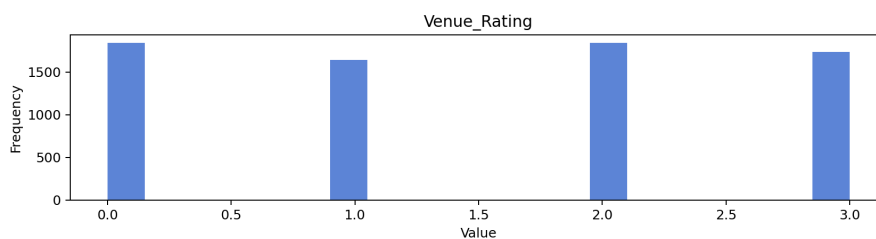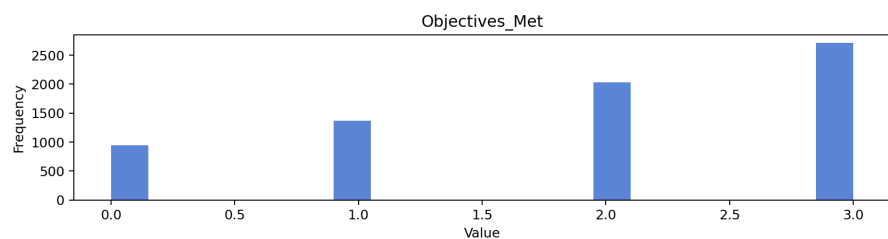
Recommendations

Analysis and Recommendations
Based on the provided feature summary, it appears that all departments have a mean rating of 0.00 and a
n overall rating of 3.00 across various aspects such as objectives met, venue, schedule, allowance, spe
aker, facilitator, and participant ratings. Since the mean ratings are 0.00, it suggests that there is
room for improvement in all areas. However, the overall rating of 3.00 indicates a moderate level of sa
tisfaction.

Recommendations for Improvement:
1. **Objectives Met:** Develop a clearer understanding of what objectives need to be met and establish
measurable goals. This will help in assessing progress and making necessary adjustments.
2. **Venue Rating:** Evaluate the current venue and consider alternatives that better meet the needs of
 participants. This could include factors such as accessibility, amenities, and ambiance.
3. **Schedule Rating:** Review the scheduling process to ensure that it is efficient, convenient, and a
llows for adequate time for all activities. Consider participant feedback to make improvements.
4. **Allowance Rating:** Assess the current allowance structure and consider adjustments to ensure that
 it is fair, reasonable, and meets the needs of participants.
5. **Speaker and Facilitator Ratings:** Provide training and support for speakers and facilitators to e
nhance their skills and delivery. Consider feedback from participants to identify areas for improvement
.
6. **Participant Rating:** Engage with participants to understand their needs, concerns, and suggestion
s. This will help in creating a more positive and inclusive experience.

Strengths to Maintain:
Although the mean ratings are 0.00, the overall rating of 3.00 suggests that there are some strengths t
o build upon. These may include:
1. **Moderate Satisfaction:** The overall rating of 3.00 indicates a moderate level of satisfaction, wh
ich suggests that some aspects of the departments are functioning reasonably well.
2. **Potential for Growth:** The low mean ratings provide an opportunity for growth and improvement, wh
ich can lead to increased satisfaction and better outcomes.

Actionable Insights:
1. **Conduct Thorough Feedback Sessions:** Engage with participants, speakers, facilitators, and other
stakeholders to gather detailed feedback and identify areas for improvement.
2. **Develop a Comprehensive Improvement Plan:** Create a plan that addresses the weaknesses and builds
 upon the strengths. This plan should include specific, measurable, achievable, relevant, and time-boun
d (SMART) objectives.
3. **Monitor Progress and Evaluate Effectiveness:** Regularly assess the progress of the improvement pl
an and make adjustments as needed. This will help in ensuring that the departments are moving in the ri
ght direction and that the desired outcomes are being achieved.

By implementing these recommendations and maintaining the existing strengths, the departments can work

towards improving overall satisfaction and achieving better outcomes.

Feature Means Across Years (Baseline: Oldest Year)
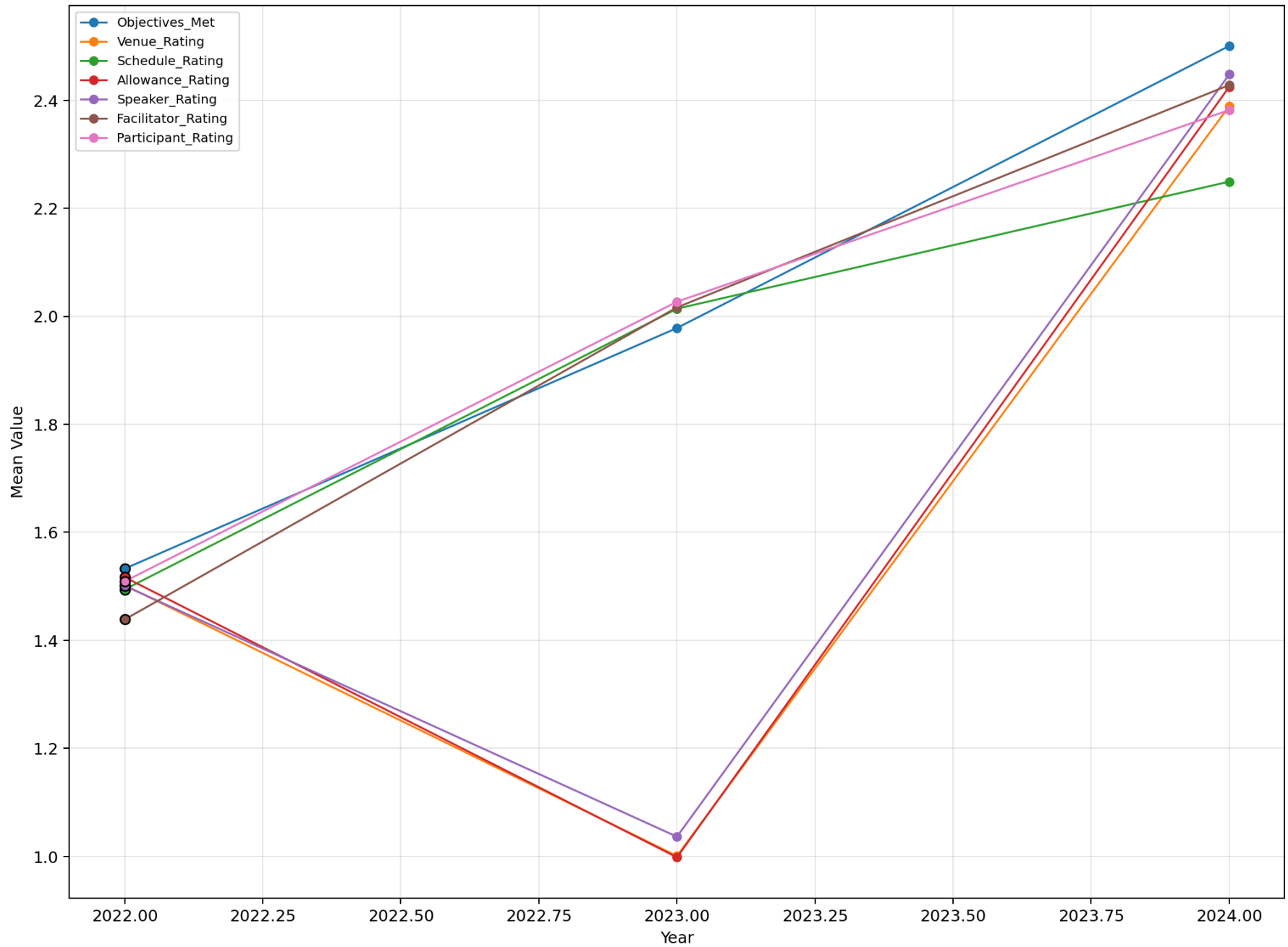
Trends Analysis

Trend Analysis: Feature Means Across Years
To analyze the trends in feature means across years, we will compare the values from 2022 to 2023, and then from 2023 to 2024. This will help us identify which features are improving, declining, or stable.
Improving Features:
1. **Objectives_Met**: The mean value increased from 1.53 (2022) to 1.98 (2023) and further to 2.50 (2024), showing a consistent upward trend.
2. **Facilitator_Rating**: The mean value increased from 1.44 (2022) to 2.02 (2023) and further to 2.43 (2024), indicating significant improvement.
3. **Participant_Rating**: The mean value increased from 1.51 (2022) to 2.03 (2023) and further to 2.38 (2024), showing a steady increase.
4. **Speaker_Rating**: The mean value increased from 1.50 (2022) to 1.04 (2023) and then significantly to 2.45 (2024), indicating a recent improvement.
5. **Schedule_Rating**: The mean value increased from 1.49 (2022) to 2.01 (2023) and further to 2.25 (2024), showing a consistent upward trend.
6. **Allowance_Rating**: The mean value increased from 1.52 (2022) to 1.00 (2023) and then significantly to 2.42 (2024), indicating a recent improvement.
7. **Venue_Rating**: The mean value decreased from 1.50 (2022) to 1.00 (2023) but then increased to 2.39 (2024), showing a recent improvement.
Declining Features (Temporary):
1. **Venue_Rating**: The mean value decreased from 1.50 (2022) to 1.00 (2023), but then increased to 2.39 (2024). This indicates a temporary decline in 2023.
2. **Allowance_Rating**: The mean value decreased from 1.52 (2022) to 1.00 (2023), but then increased to 2.42 (2024). This indicates a temporary decline in 2023.
3. **Speaker_Rating**: The mean value decreased from 1.50 (2022) to 1.04 (2023), but then increased to 2.45 (2024). This indicates a temporary decline in 2023.
Stable Features:
None of the features showed a completely stable trend across all three years.
Actionable Insights:
1. **Invest in Facilitator Training**: The significant improvement in Facilitator_Rating suggests that investing in facilitator training and development has paid off.
2. **Focus on Speaker Selection**: The recent improvement in Speaker_Rating indicates that efforts to select high-quality speakers are showing positive results.
3. **Continuously Evaluate and Improve Venue Selection**: The temporary decline in Venue_Rating in 2023 suggests that venue selection needs to be continuously evaluated and improved to meet participant expectations.
4. **Review Allowance Policies**: The temporary decline in Allowance_Rating in 2023 may indicate that allowance policies need to be reviewed and adjusted to ensure they are fair and competitive.

5. **Monitor Schedule and Objectives**: The consistent improvement in Schedule_Rating and Objectives_Me
t suggests that efforts to streamline schedules and set achievable objectives are effective. Continue t
o monitor and refine these processes.
By analyzing the trends in feature means across years, we can identify areas of improvement, decline, a
nd stability. These insights can inform strategic decisions to optimize features, improve participant s
atisfaction, and drive overall success.