**Root Cause Analysis** In [3]: # Convert the scheduled\_departure\_date to datetime format satisfaction\_df['scheduled\_departure\_date'] = pd.to\_datetime(satisfaction\_df['scheduled\_departure\_date']) # Filter for summer months  $summer\_months = [6, 7, 8, 9]$ filtered\_satisfaction\_df = satisfaction\_df[satisfaction\_df['scheduled\_departure\_date'].dt.month.isin(summer\_months)] # Filter for scores from 1 to 5 filtered\_satisfaction\_df = filtered\_satisfaction\_df[filtered\_satisfaction\_df['score'].isin(['1', '2', '3', '4', '5'])] In [4]: # Plot distribution of scores for September plt.figure(figsize=(10, 6)) ax = sns.countplot(data=satisfaction\_df, x='score', order=['1', '2', '3', '4', '5'], palette="Blues\_d") plt.title('Distribution of F&B Satisfaction Scores for September') plt.xlabel('Satisfaction Score') plt.ylabel('Count') for bars in ax.containers: ax.bar\_label(bars) plt.show() Distribution of F&B Satisfaction Scores for September 8000 7713 7000 6733 6390 5877 6000 5000 ತ 4000 3000 2000 1000 Satisfaction Score In [13]: # Plot distribution of scores based on haul type plt.figure(figsize=(12, 7)) ax = sns.countplot(data=satisfaction\_df, x='score', hue='haul\_type', order=['1', '2', '3', '4', '5'], palette="muted") plt.title('Distribution of F&B Satisfaction Scores by Haul Type for September') plt.xlabel('Satisfaction Score') plt.ylabel('Count') plt.legend(title='Haul Type') **for** bars **in** ax.containers: ax.bar\_label(bars) plt.show() Distribution of F&B Satisfaction Scores by Haul Type for September 5000 Haul Type Short Medium 4219 Long 4005 4000 3627 3000 2561 2573 2000 1661 1531 1385 1000 1000 933 862 589 3 Satisfaction Score In [6]: # Plot distribution of scores based on cabin type plt.figure(figsize=(12, 7)) ax = sns.countplot(data=satisfaction\_df, x='score', hue='cabin\_name', order=['1', '2', '3', '4', '5'], palette="Set2") plt.title('Distribution of F&B Satisfaction Scores by Cabin Type for September') plt.xlabel('Satisfaction Score') plt.ylabel('Count') plt.legend(title='Cabin Type') for bars in ax.containers: ax.bar\_label(bars) plt.show() Distribution of F&B Satisfaction Scores by Cabin Type for September Cabin Type Economy 3500 3365 Economy Plus 3072 3040 3000 2754 2500 1000 2000 1788 1626 1457 1500 1219 1181 1000 500 Satisfaction Score # Plot distribution of scores based on flight type (Domestic vs. International) plt.figure(figsize=(12, 7)) ax = sns.countplot(data=satisfaction\_df, x='score', hue='international\_domestic\_indicator', order=['1', '2', '3', '4', '5'], palette="pastel") plt.title('Distribution of F&B Satisfaction Scores by Flight Type for September') plt.xlabel('Satisfaction Score') plt.ylabel('Count') plt.legend(title='Flight Type') for bars in ax.containers:

In [1]:

In [2]:

import pandas as pd
import numpy as np

import seaborn as sns

from matplotlib import pyplot as plt

satisfaction\_df = pd.read\_csv('Survey data\_Inflight Satisfaction Score.csv')

comments\_df = pd.read\_csv('Survey data \_Customer comments.csv')

from collections import Counter



Satisfaction Score

"just", "where", "too", "only", "myself", "which", "those", "i",
"after", "few", "whom", "t", "being", "if", "theirs", "my",
"against", "a", "by", "doing", "it", "how", "further", "was", "here", "than", "would", "could"

food\_related\_comments = comments\_df[comments\_df['verbatim\_text'].str.contains("food", case=False, na=False)]

he app and preorder. Also, the quality of the food could be better. I fly international so I know this is possible.',

It was terrible food and service and WAY below the standard for the Polaris class tickets we bought for our 25th anniversary.',

'Food selection is so limited . Each flight should serve different sandwiches as an option instead of just snack boxes.',

'WHAT I AM NOT HAPPY ABOUT IS YOU CAN NOT PAY FOR XTRA FOOD OR SNAKS WITH CASH, I AM A CAS PERSON AND DONOT CARRY MY PHONE ON MY VACATION AND WOUL

'I sat in 5a and the meal I would choose was unavailable. The only in-flight snacks were chips and one type of chocolate. Looks like I need to bri

'we were told the flight had very limited selection and when it got to row 42 there was not much left. Had I known I would have purchased food in

'FOOD (all choices) was disgusting. Could only eat a cookie for a 7 1/2 flight to Ireland <\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)><\(\frac{1}{2}\)>

'Food was not that great. I believe there are 30 seats in business and they were only four servings of fish. If you offer three items, you would think United would have at least 1/3 of each. For the price of the ticket, your food really is pretty awful. And when are you going to acknowledge g

'Limited choices even when pre-ordering on the app - why?. When you have a day or two notice, there should be more choices. No motivation to use t

'The chicken entree was a thai chicken noodle. The problem is thai food tends to contain peanuts and neither of the stewardesses knew if this entr

'Also, the lunch service was served so late that I only had 5 minutes to eat a cheeseburger before having my plate cleared for landing--not sure w hy that happened when the flight was nearly 10 hours. The lounge in Rome was awful. I think it was called Prima Vista right by our gate E41 at FCO.

'It was the same options as I had from SFO to CDG in May. You need to vary the options so it is not always the same. I was quite surprised it was

'The special meal was served way before the others. I do not like the feeling of eating long before others get their food. Less separation in time

'I was very surprised to not receive a snack on this flight. I have flown this same route many times before and previously received a snack.',

'On flights of 5 hrs a complimentary meal should be served. We were given on snack. At least two should be offered on long flights.',

ople congregating around my seat or standing over me while they look through a basket. Walk the basket around and put it in the galley.',

'Our lunch entry was very good. It was chicken in a creamy mushroom sauce. The meal also had scalloped potatoes and green beans. For our last snac

"I am 1k and flying in first class, confuses me why there would not be a gluten free option. Meanwhile if I fly in economy. I have the complimenta ry snack option and can obtain GF. If I ask for GF in first class, there is about a 75% chance they offer to check in the cart in the back. A few a re confused and few difficult. It would seem an easy fix for admin to set the FA's up for success with standard option and friendly customer se

'You show Burger Bistro on the menu but was not available. I think a flight between 12-3pm should have options like the Bistro since its around lu

'The only snacks that were offered were sweets such as cookies. It would be better if there was a savory selection such as chips or crackers as we

'On SWA they offer your choice of beverages and they provide a snack (pretzels). On United they say that due to the short flight they can only pro

'1-bring back read predeparture beverages (not only water or champage) 2-dont put snacks on the platform above the bulkhead seat. I do not want pe

'Since we had not pre-ordered our meal (did not receive a notification to do that as we had on the outbound flight), my husband almost did not receive his first choice. And I heard the flight attendant offer a snack box to another passenger as his choice was not available. It seems a snack bo

'New Orleans to Houston is a very short fliught, so did not expect food/beverage. But this is my only chance to comment that there was no food/sna

'A small sandwich snack was provided shortly before arrival. It was pretty bad. The bread was dried out and tough, only 1 thin piece of meat.',

'I was glad to see snacks and a variety of drinks served. And on some flights we were even offered a choice of snacks. Thank you!.',

Survey Trends: F&B Customer dissatisfaction

"or", "who", "as", "from", "him", "each", "the", "themselves", "until", "below", "are", "we", "these", "your", "his", "through",

"don", "nor", "me", "were", "her", "more", "himself", "this", "down", "should", "our", "their", "while", "above", "both", "up"

"to", "ours", "had", "she", "all", "no", "when", "at", "any", "before", "them", "same", "and", "been", "have", "in", "will", "on", "does", "yourselves", "then", "that", "because", "what", "over", "why", "so", "can", "did", "not", "now", "under", "he", "you", "herself", "has",

tokens = [word for word in tokens if word not in stop\_words and word.isalpha()]

simple\_tokens\_list = comments\_df['verbatim\_text'].dropna().apply(simple\_preprocess)

all\_simple\_tokens = [token for sublist in simple\_tokens\_list for token in sublist]

"ourselves", "hers", "between", "yourself", "but",

"again", "there", "about", "once", "during", "out",
"very", "having", "with", "they", "own", "an", "be",
"some", "for", "do", "its", "yours", "such", "into",
"of", "most", "itself", "other", "off", "is", "s", "am",

In [8]:

1000

500

])

Out[14]: [('food', 1294),

In [18]:

# Define a set of common stopwords

# Define a function to preprocess text

tokens = text.lower().split()
# Remove stopwords and punctuation

# Convert to lowercase and tokenize

# Apply the function to the verbatim\_text column

simple\_word\_freq = Counter(all\_simple\_tokens)

# Extract sample comments that mention the word "food"

# Display a sample of these comments - sample size of 30

'The food box can be improved. It is was not the best for me.',

'Offer simpler food options eg a cheese sandwich and fruit.', 'Even first class. Pretzels. No thanks. Food is limited.',

'On this flight we were not offered any food or beverages.',

'Hoping for food in first class but short flight I guess.',

'Food preordered in f class was good and appropriately hot.',

# Extract sample comments that mention the word "snack"

k we had a warm pretzel bun filled with turkey and cheese.',

'We were not given any snacks either segment of our flight.',

nch time. The Tapas boxes do not cut it for me, they are good as snacks.',

'snacks were not large portions. there was no gluten free options.',

'It would be nice to have more variety on snacks with a long flight and food.',

ck on any of the other 3 legs of this trip when the flights were longer.',

'No snacks, unless I was supposed to ask or pay for them?.',

rvice for those of us who need this option.",
 'No free snack inflight is a but surprising.',
 'I would like to see better snacks like chips.',

'Maybe provide a little bigger bag of snack.',

'we were not offer any food or snacks.',
'Love those little waffel snacks!.',

x should not be a choice for first class.',

the exact same choice. And the food was barely room temperature.',

'Fish entree was so so!. Ok!. It is airline food!.',

'No food and/or beverages served.',

'it was a limited selection of the food.',

'The service was good. food was ok.',

# Display a sample of these comments

D PREFER TO PAY CASH NOT BY CREDIT CARD.', 'there was only a minimal food selection.',

sample\_food\_comments = food\_related\_comments['verbatim\_text'].sample(30).tolist()

'Food selections are a bit too complex. Simple sandwich or scramble preferred.',

ee contained peanuts which is important because my son has a peanut allergy.',

'It would be nice to offer some kind of real food versus junk food. Coffee was sour tasting.',

'As I said earlier, the food from London to Denver was better than the food Denver to London.',

'Again, I was not awakened when breakfast was served, thus missed the food, coffee, and water.',

'The food selection could be improved given I had paid business class so expected a bit more.',

'It would be nice to offer more of a variety of food items to purchase that are more healthy.']

sample\_snack\_comments = snack\_related\_comments['verbatim\_text'].sample(30).tolist()

'Fantastic to get a selection of snacks in addition to the snack box!!.',
'I appreciate the option of ordering a snack due to my Premier 1K status.',

snack\_related\_comments = comments\_df[comments\_df['verbatim\_text'].str.contains("snack", case=False, na=False)]

'On a flight that long, the flight attendants should come around more than once to offer snacks or drinks.',

'Fresh, complementary, my children ordered additional snacks and drinks, very efficient and delicious.',

'We were not offered any snacks or given the option to purchase any items which is unusual for that flight.']

'It would have been nice to provide a small snack (even crackers or pretzels). All that was served was a beverage.',

'I was able to purchase food on the plane that I was not allowed to purchase 3 days before the flight.',

Out[18]: ['The food seemed an odd combination of cold udon noodles as salad and a beef entree.',

def simple\_preprocess(text):

# Flatten the list of tokens

# Get the frequency of each token

simple\_word\_freq.most\_common(20)

return tokens

('flight', 1157), ('snack', 744), ('meal', 631), ('like', 598), ('offered', 540), ('options', 474), ('snacks', 455), ('first', 448), ('better', 425),

('nice', 395), ('good', 391), ('chicken', 377), ('class', 353), ('one', 350), ('get', 343), ('served', 340), ('offer', 328), ('water', 322), ('united', 303)]

sample\_food\_comments

ng a food pack with me.',

luten intolerance?.',

would be preferable.',

sample\_snack\_comments

Out[11]: ['Would have liked some snack.',

ll to choose from.',

'No snacks were served.',

vide water.',

'no snacks.',

In [11]:

the airport.',

stop\_words = set([

In [14]: