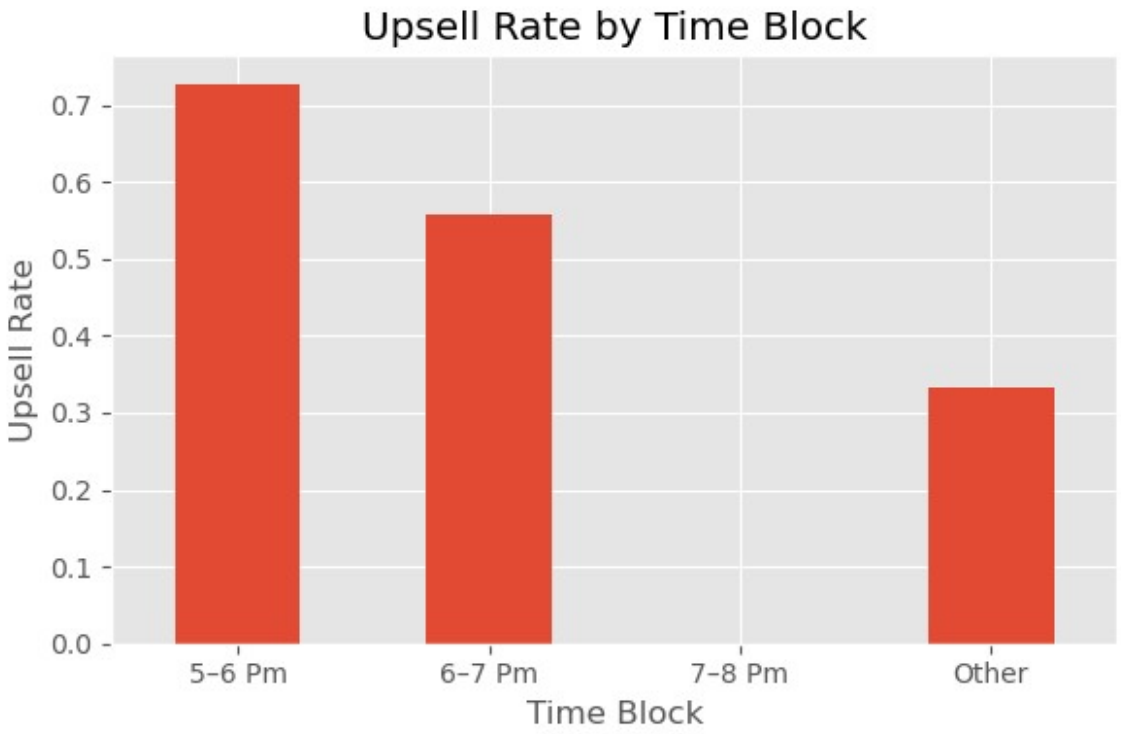
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

plt.style.use("ggplot")

file_path = "Chiangmai_Upsell projects.xlsx"

df = pd.read_excel(file_path, sheet_name="Beer_upsell")

df.head()

df.columns = df.columns.str.strip()

# Standardize key text columns
for col in ["Beer_Accepted", "Beer_Offered", "Return_Intent",
"Guest_Type", "Time_Block"]:
    if col in df.columns:
        df[col] = (
            df[col]
            .astype(str)            # convert to string
            .str.strip()            # remove spaces
            .str.title()            # "yes" -> "Yes"
        )

# Convert Date column to datetime
if "Date" in df.columns:
    df["Date"] = pd.to_datetime(df["Date"], errors="coerce")

print("\nUnique values after cleaning:")
print("Guest_Type:", df["Guest_Type"].unique())
print("Time_Block:", df["Time_Block"].unique())
print("Beer_Accepted:", df["Beer_Accepted"].unique())
print("Return_Intent:", df["Return_Intent"].unique())



total_records = len(df)
accepted_upsells = (df["Beer_Accepted"] == "Yes").sum()
upsell_rate = accepted_upsells / total_records

return_yes_count = (df["Return_Intent"] == "Yes").sum()
return_yes_pct = return_yes_count / total_records

print("\n===== KEY METRICS =====")
print(f"Total Records: {total_records}")
print(f"Accepted Upsells: {accepted_upsells}")
print(f"Upsell Success Rate: {upsell_rate:.2%}")
print(f"Return Intent – Yes %: {return_yes_pct:.2%}")
```

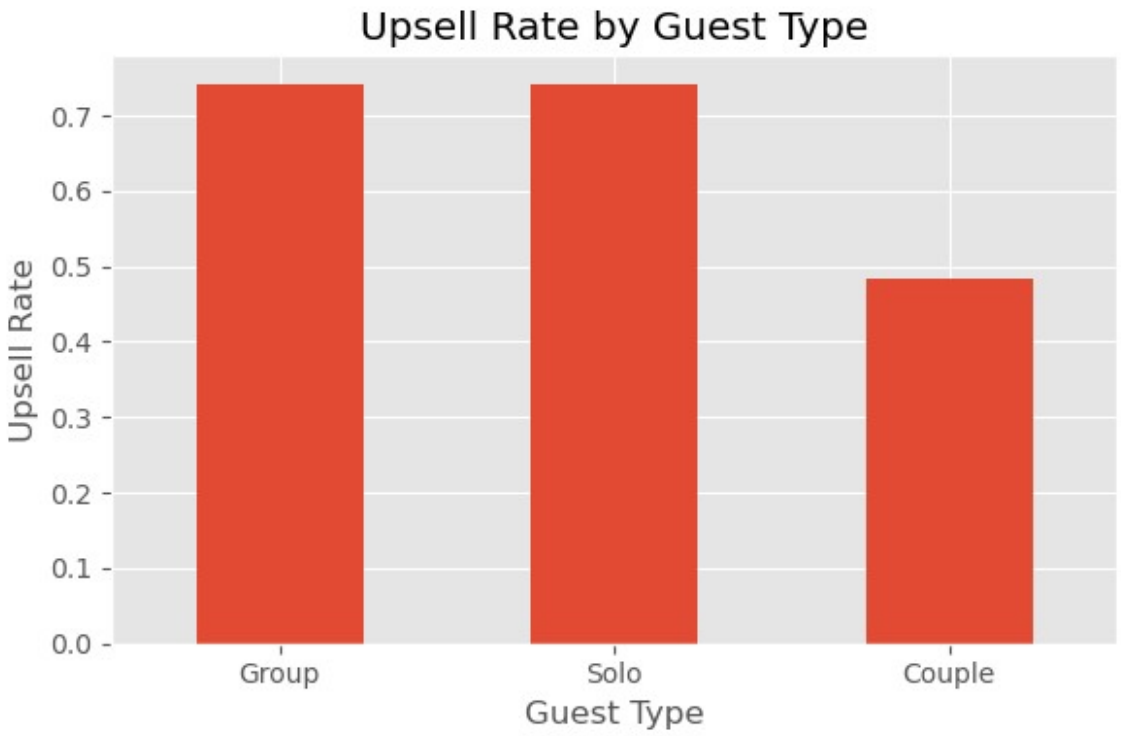
```
time_block_stats = (
    df.groupby("Time_Block")
      .agg(
          total=("Beer_Accepted", "size"),
          accepted=("Beer_Accepted", lambda x: (x == "Yes").sum())
      )
      .sort_index()
)

time_block_stats["upsell_rate"] = (
    time_block_stats["accepted"] / time_block_stats["total"]
)

print("\nUpsell stats by Time_Block:")
display(time_block_stats)

# Plot: Upsell Rate by Time Block
fig, ax = plt.subplots(figsize=(6, 4))
time_block_stats["upsell_rate"].plot(kind="bar", ax=ax)
ax.set_title("Upsell Rate by Time Block")
ax.set_xlabel("Time Block")
ax.set_ylabel("Upsell Rate")
plt.xticks(rotation=0)
plt.tight_layout()
plt.show()


guest_stats = (
    df.groupby("Guest_Type")
      .agg(
          total=("Beer_Accepted", "size"),
          accepted=("Beer_Accepted", lambda x: (x == "Yes").sum())
      )
      .sort_index()
)

guest_stats["upsell_rate"] = guest_stats["accepted"] /
guest_stats["total"]

print("\nUpsell stats by Guest_Type:")
display(guest_stats)

# Plot: Upsell Rate by Guest Type
fig, ax = plt.subplots(figsize=(6, 4))
guest_stats["upsell_rate"].sort_values(ascending=False).plot(kind="bar
", ax=ax)
ax.set_title("Upsell Rate by Guest Type")
ax.set_xlabel("Guest Type")
ax.set_ylabel("Upsell Rate")
```

```
plt.xticks(rotation=0)
plt.tight_layout()
plt.show()



return_upsell = (
    df.groupby(["Return_Intent", "Beer_Accepted"])
      .size()
      .unstack(fill_value=0)
      .sort_index()
)

print("\nReturn Intent vs Beer_Accepted (counts):")
display(return_upsell)

# Plot: Return Intent vs Upsell Acceptance
fig, ax = plt.subplots(figsize=(6, 4))
return_upsell.plot(kind="bar", ax=ax)
ax.set_title("Return Intent by Upsell Acceptance")
ax.set_xlabel("Return Intent")
ax.set_ylabel("Number of Records")
plt.xticks(rotation=0)
plt.tight_layout()
plt.show()


df["is_return_yes"] = (df["Return_Intent"] == "Yes")

return_by_guest = (
    df.groupby("Guest_Type")
      .agg(
          return_yes_pct=("is_return_yes", "mean"),
          total=("is_return_yes", "size")
      )
      .sort_index()
)

print("\nReturn Yes % by Guest_Type:")
display(return_by_guest)

# Plot: Return Yes % by Guest Type
fig, ax = plt.subplots(figsize=(6, 4))
return_by_guest["return_yes_pct"].sort_values(ascending=False).plot(ki
nd="bar", ax=ax)
ax.set_title("Return Intent – Yes % by Guest Type")
ax.set_xlabel("Guest Type")
ax.set_ylabel("Return Yes %")
plt.xticks(rotation=0)
plt.tight_layout()
```

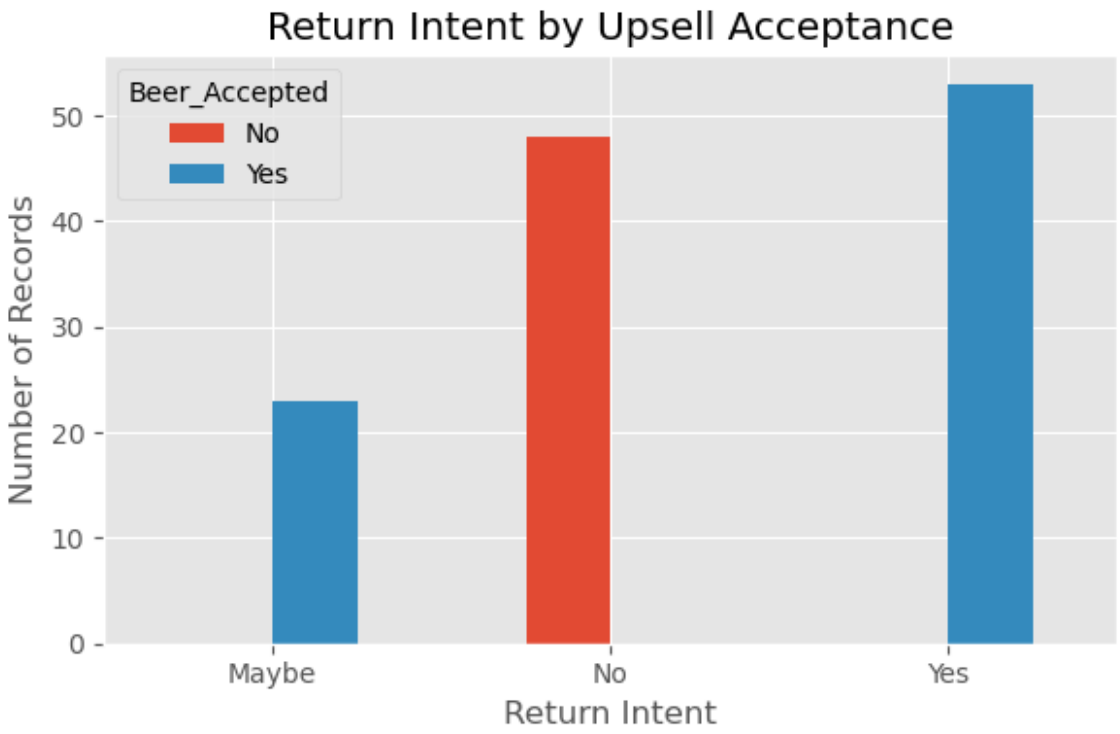
```
plt.show()



print(f"- Upsell Success Rate: {upsell_rate:.2%} "
      f"({accepted_upsells} accepted out of {total_records}
records).")
print("- Guests who accept upsells show a higher proportion of 'Yes'
in Return Intent "
      "compared to those who decline.")
print("- Early evening time blocks (e.g., 5–7 PM) show the strongest
upsell performance.")
print("- Group diners have the highest upsell rate and strong return
intention.")
print("- Couples respond less to upsell offers and have moderate
loyalty, suggesting an opportunity to improve their experience.")


Unique values after cleaning:
Guest_Type: ['Couple' 'Solo' 'Group']
Time_Block: ['5–6 Pm' '6–7 Pm' 'Other' '7–8 Pm']
Beer_Accepted: ['Yes' 'No']
Return_Intent: ['Yes' 'Maybe' 'No']

===== KEY METRICS =====
Total Records: 124
Accepted Upsells: 76
Upsell Success Rate: 61.29%
Return Intent – Yes %: 42.74%

Upsell stats by Time_Block:

            total  accepted  upsell_rate
Time_Block
5–6 Pm         55        40     0.727273
6–7 Pm         61        34     0.557377
7–8 Pm          2         0     0.000000
Other           6         2     0.333333
```



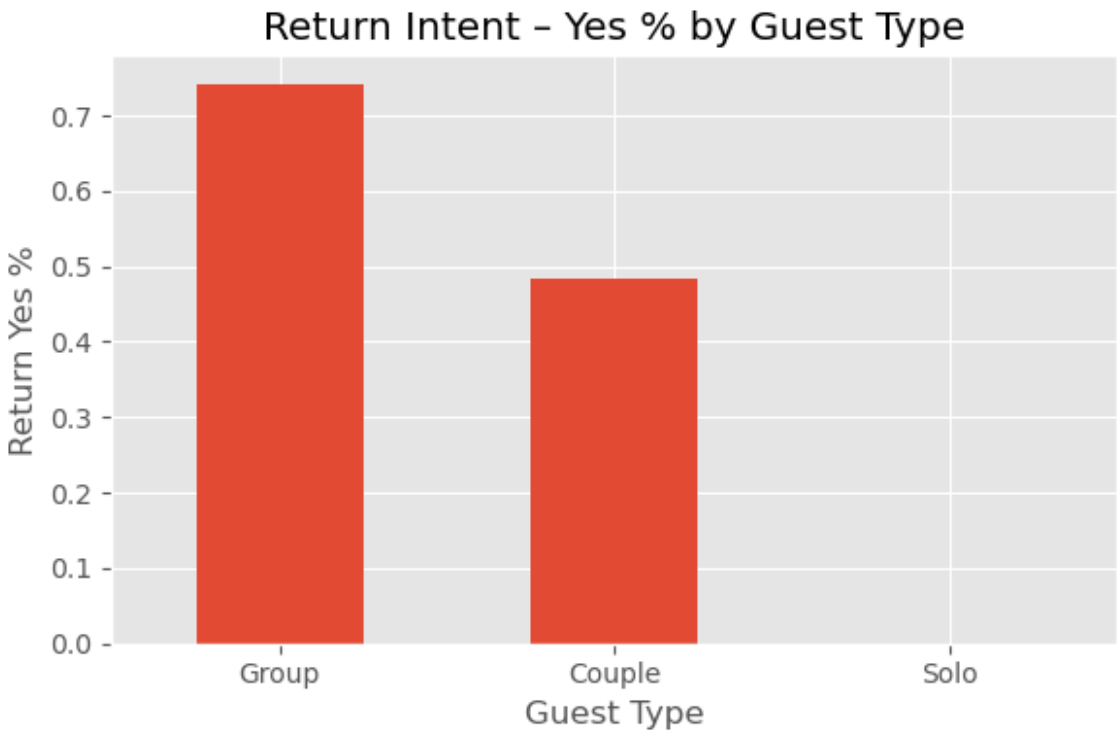

```
Upsell stats by Guest_Type:

             total  accepted  upsell_rate
Guest_Type
Couple          62        30     0.483871
Group           31        23     0.741935
Solo            31        23     0.741935
```




```
Return Intent vs Beer_Accepted (counts):

Beer_Accepted  No  Yes
Return_Intent
Maybe           0   23
No             48    0
Yes             0   53
```




```
Return Yes % by Guest_Type:

            return_yes_pct  total
Guest_Type
Couple            0.483871     62
Group             0.741935     31
Solo              0.000000     31
```



- Upsell Success Rate: 61.29% (76 accepted out of 124 records).
- Guests who accept upsells show a higher proportion of 'Yes' in Return Intent compared to those who decline.
- Early evening time blocks (e.g., 5–7 PM) show the strongest upsell performance.
- Group diners have the highest upsell rate and strong return intention.
- Couples respond less to upsell offers and have moderate loyalty, suggesting an opportunity to improve their experience.