de-ministry

October 24, 2024

[30]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

[31]:
```
from google.colab import files
uploaded = files.upload()
```

```
<IPython.core.display.HTML object>
```

```
Saving ministries_budget.xlsx to ministries_budget (1).xlsx
```

[32]:
```
data = pd.read_excel('ministries_budget.xlsx')
data.head()
```

[32]:

	Ministry/Department	2024-25	2023-24	2022-23	2021-22	2020-21	2019-20	2018-19	2017-18	2016-17	2015-16	2014-15	2013-14
0	Ministry of Agriculture and Farmers Welfare	132469.86	125035.79	132513.62	131531.19	142762.35	129585.21	58080.00	51026.00	45035.20	24909.78	31542.95	30223.88
1	DEPARTMENT OF ATOMIC ENERGY	24968.98	25078.49	22723.58	18264.89	18228.94	24167.89	21518.38	12461.20	18682.48	10912.00	13995.75	14990.46
2	MINISTRY OF AYUSH	3712.49	3647.50	3050.00	2970.30	2122.08	2245.76	2130.80	1428.65	1326.20	1214.00	1272.15	1259.00
3	MINISTRY OF CHEMICALS AND FERTILISERS	168499.87	178481.99	107715.38	80714.94	71896.92	78515.00	73946.57	70578.45	74552.77	73562.00	77718.55	72454.54
4	MINISTRY OF CIVIL AVIATION	2357.14	3113.36	10667.00	3224.67	3797.71	4500.00	6602.86	2702.00	2590.72	3341.50	7378.02	5882.22

[33]:
```
data.describe()
```

[33]:

	2024-25	2023-24	2022-23	2021-22	2020-21
count	5.600000e+01	5.600000e+01	5.600000e+01	5.500000e+01	5.500000e+01
mean	8.608467e+04	8.041245e+04	7.044480e+04	6.333156e+04	5.531327e+04
std	2.631114e+05	2.407488e+05	2.175095e+05	1.982394e+05	1.692778e+05
min	6.400000e+01	6.300000e+01	4.700000e+01	3.925000e+01	5.052000e+01
25%	3.153630e+03	3.109420e+03	2.906492e+03	2.062005e+03	2.310955e+03
50%	9.470570e+03	8.399310e+03	8.695890e+03	5.753000e+03	5.753000e+03
75%	4.021329e+04	4.986369e+04	3.801657e+04	3.950800e+04	3.668975e+04
max	1.858159e+06	1.689719e+06	1.538779e+06	1.386273e+06	1.168937e+06

	2019-20	2018-19	2017-18	2016-17
count	5.400000e+01	53.000000	52.000000	51.000000
mean	6.104842e+04	45714.869811	39887.303269	38496.956863
std	1.748451e+05	134653.067992	114347.217007	112103.544411
min	1.938000e+01	18.860000	17.880000	17.300000
25%	2.304960e+03	2130.800000	1823.827500	1591.160000
50%	6.657480e+03	6000.000000	5062.530000	4752.830000
75%	3.738820e+04	31100.550000	23860.395000	18295.300000
max	1.172770e+06	894706.820000	740168.990000	723460.840000

	2015-16	2014-15	2013-14
count	50.000000	51.000000	51.000000
mean	34849.991800	34657.100392	33367.799020
std	105213.848967	100918.916542	101518.989228
min	15.570000	14.350000	13.280000
25%	1541.712500	2106.855000	1500.785000
50%	4547.005000	5697.430000	4951.680000
75%	21174.182500	18284.810000	17715.230000
max	679960.980000	682345.000000	673885.250000

[34]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 56 entries, 0 to 55
Data columns (total 13 columns):
 #   Column               Non-Null Count  Dtype
---  ------               --------------  -----
 0   Ministry/Department  56 non-null     object
 1   2024-25              56 non-null     float64
 2   2023-24              56 non-null     float64
 3   2022-23              56 non-null     float64
 4   2021-22              55 non-null     float64
 5   2020-21              55 non-null     float64
 6   2019-20              54 non-null     float64
 7   2018-19              53 non-null     float64
 8   2017-18              52 non-null     float64
 9   2016-17              51 non-null     float64
```

```
 10  2015-16              50 non-null     float64
 11  2014-15              51 non-null     float64
 12  2013-14              51 non-null     float64
dtypes: float64(12), object(1)
memory usage: 5.8+ KB
```

[35]:
```
data.duplicated().sum()
```

[35]:
```
0
```

[36]:
```
data.isna().sum()
```

[36]:
```
Ministry/Department    0
2024-25                0
2023-24                0
2022-23                0
2021-22                1
2020-21                1
2019-20                2
2018-19                3
2017-18                4
2016-17                5
2015-16                6
2014-15                5
2013-14                5
dtype: int64
```

[37]:
```
# Apply forward-fill to handle missing values
data_cleaned = data.fillna(method='ffill')

# Verify if all missing values are filled
missing_values_summary = data_cleaned.isnull().sum()

# Display the cleaned data and missing value summary
data_cleaned.head(), missing_values_summary
```

```
<ipython-input-37-544a0a7ecb9a>:2: FutureWarning: DataFrame.fillna with 'method'
is deprecated and will raise in a future version. Use obj.ffill() or obj.bfill()
instead.
  data_cleaned = data.fillna(method='ffill')
```

[37]:
```
(                          Ministry/Department   2024-25    2023-24   \
 0  Ministry of Agriculture and Farmers Welfare  132469.86  125035.79
 1                   DEPARTMENT OF ATOMIC ENERGY   24968.98   25078.49
 2                              MINISTRY OF AYUSH    3712.49    3647.50
 3        MINISTRY OF CHEMICALS AND FERTILISERS  168499.87  178481.99
 4                   MINISTRY OF CIVIL AVIATION     2357.14    3113.36
```

```
    2022-23    2021-22    2020-21    2019-20   2018-19   2017-18    2016-17  \
0  132513.62  131531.19  142762.35  129585.21  58080.00  51026.00  45035.20
1   22723.58   18264.89   18228.94   24167.89  21518.38  12461.20  18682.48
2    3050.00    2970.30    2122.08    2245.76   2130.80   1428.65   1326.20
3  107715.38   80714.94   71896.92   78515.00  73946.57  70578.45  74552.77
4   10667.00    3224.67    3797.71    4500.00   6602.86   2702.00   2590.72

    2015-16   2014-15   2013-14
0  24909.78  31542.95  30223.88
1  10912.00  13995.75  14990.46
2   1214.00   1272.15   1259.00
3  73562.00  77718.55  72454.54
4   3341.50   7378.02   5882.22  ,
Ministry/Department    0
2024-25                0
2023-24                0
2022-23                0
2021-22                0
2020-21                0
2019-20                0
2018-19                0
2017-18                0
2016-17                0
2015-16                0
2014-15                0
2013-14                0
dtype: int64)
```

[38]:
```
years = data_cleaned.columns[1:]
for year in years:
    print(f"\nTop 5 Ministries by Budget Allocation in {year}:")
    top_5 = data_cleaned[['Ministry/Department', year]].sort_values(by=year,␣
 ↪ascending=False).head(5)
    print(top_5)

    print(f"\nBottom 5 Ministries by Budget Allocation in {year}:")
    bottom_5 = data_cleaned[['Ministry/Department', year]].sort_values(by=year).
 ↪head(5)
    print(bottom_5)
    print("-" * 50)
```

```
Top 5 Ministries by Budget Allocation in 2024-25 :
                                Ministry/Department    2024-25
19                                MINISTRY OF FINANCE  1858158.52
12                                MINISTRY OF DEFENCE   621940.95
43            MINISTRY OF ROAD TRANSPORT AND HIGHWAYS   278000.00
```

```
42                                MINISTRY OF RAILWAYS   255393.00
8   MINISTRY OF CONSUMER AFFAIRS, FOOD AND PUBLIC …   223323.36

Bottom 5 Ministries by Budget Allocation in 2024-25 :
                  Ministry/Department  2024-25
35  MINISTRY OF PARLIAMENTARY AFFAIRS     64.00
5                    MINISTRY OF COAL    192.55
50                  MINISTRY OF STEEL    325.66
38               MINISTRY OF PLANNING    837.26
9             MINISTRY OF COOPERATION   1183.39
--------------------------------------------------

Top 5 Ministries by Budget Allocation in 2023-24 :
                                  Ministry/Department    2023-24
19                                MINISTRY OF FINANCE  1689719.17
12                                MINISTRY OF DEFENCE   593537.64
43            MINISTRY OF ROAD TRANSPORT AND HIGHWAYS   270434.71
42                               MINISTRY OF RAILWAYS   241267.51
8   MINISTRY OF CONSUMER AFFAIRS, FOOD AND PUBLIC …   205764.60

Bottom 5 Ministries by Budget Allocation in 2023-24 :
                  Ministry/Department  2023-24
35  MINISTRY OF PARLIAMENTARY AFFAIRS     63.00
50                  MINISTRY OF STEEL     70.15
5                    MINISTRY OF COAL    192.32
10      MINISTRY OF CORPORATE AFFAIRS    756.19
38               MINISTRY OF PLANNING    824.39
--------------------------------------------------

Top 5 Ministries by Budget Allocation in 2022-23 :
                                  Ministry/Department    2022-23
19                                MINISTRY OF FINANCE  1538779.45
12                                MINISTRY OF DEFENCE   525166.15
8   MINISTRY OF CONSUMER AFFAIRS, FOOD AND PUBLIC …   217684.46
43            MINISTRY OF ROAD TRANSPORT AND HIGHWAYS   199107.71
24                           MINISTRY OF HOME AFFAIRS   185776.55

Bottom 5 Ministries by Budget Allocation in 2022-23 :
                  Ministry/Department  2022-23
50                  MINISTRY OF STEEL     47.00
35  MINISTRY OF PARLIAMENTARY AFFAIRS     66.40
38               MINISTRY OF PLANNING    321.42
5                    MINISTRY OF COAL    393.24
10      MINISTRY OF CORPORATE AFFAIRS    733.02
--------------------------------------------------

Top 5 Ministries by Budget Allocation in 2021-22 :
                                  Ministry/Department    2021-22
```

```
19                                MINISTRY OF FINANCE  1386273.30
12                                MINISTRY OF DEFENCE   478195.62
8   MINISTRY OF CONSUMER AFFAIRS, FOOD AND PUBLIC …   256948.40
9                              MINISTRY OF COOPERATION   256948.40
24                            MINISTRY OF HOME AFFAIRS   166546.94

Bottom 5 Ministries by Budget Allocation in 2021-22 :
                  Ministry/Department  2021-22
50                  MINISTRY OF STEEL     39.25
35  MINISTRY OF PARLIAMENTARY AFFAIRS     65.07
5                    MINISTRY OF COAL    534.88
10      MINISTRY OF CORPORATE AFFAIRS    712.13
34         MINISTRY OF PANCHAYATI RAJ    913.43
--------------------------------------------------

Top 5 Ministries by Budget Allocation in 2020-21 :
                                  Ministry/Department    2020-21
19                                MINISTRY OF FINANCE  1168937.34
12                                MINISTRY OF DEFENCE   471378.00
24                            MINISTRY OF HOME AFFAIRS   167250.33
0         Ministry of Agriculture and Farmers Welfare   142762.35
8   MINISTRY OF CONSUMER AFFAIRS, FOOD AND PUBLIC …   124535.43

Bottom 5 Ministries by Budget Allocation in 2020-21 :
                  Ministry/Department  2020-21
35  MINISTRY OF PARLIAMENTARY AFFAIRS     50.52
50                  MINISTRY OF STEEL    100.00
38               MINISTRY OF PLANNING    650.00
10      MINISTRY OF CORPORATE AFFAIRS    727.62
5                    MINISTRY OF COAL    882.61
--------------------------------------------------

Top 5 Ministries by Budget Allocation in 2019-20 :
                                  Ministry/Department    2019-20
19                                MINISTRY OF FINANCE  1172769.50
42                               MINISTRY OF RAILWAYS   500140.23
8   MINISTRY OF CONSUMER AFFAIRS, FOOD AND PUBLIC …   242240.39
9                              MINISTRY OF COOPERATION   242240.39
44                      MINISTRY OF RURAL DEVELOPMENT   194097.58

Bottom 5 Ministries by Budget Allocation in 2019-20 :
                  Ministry/Department  2019-20
35  MINISTRY OF PARLIAMENTARY AFFAIRS     19.38
50                  MINISTRY OF STEEL    241.29
10      MINISTRY OF CORPORATE AFFAIRS    578.63
38               MINISTRY OF PLANNING    583.40
5                    MINISTRY OF COAL    822.05
--------------------------------------------------
```

Top 5 Ministries by Budget Allocation in 2018-19 :

	Ministry/Department	2018-19
20	MINISTRY OF FISHERIES, ANIMAL HUSBANDRY AND DA…	894706.82
19	MINISTRY OF FINANCE	894706.82
12	MINISTRY OF DEFENCE	404364.71
8	MINISTRY OF CONSUMER AFFAIRS, FOOD AND PUBLIC …	175944.27
9	MINISTRY OF COOPERATION	175944.27

Bottom 5 Ministries by Budget Allocation in 2018-19 :

	Ministry/Department	2018-19
35	MINISTRY OF PARLIAMENTARY AFFAIRS	18.86
50	MINISTRY OF STEEL	47.90
38	MINISTRY OF PLANNING	339.65
10	MINISTRY OF CORPORATE AFFAIRS	564.15
5	MINISTRY OF COAL	770.91

Top 5 Ministries by Budget Allocation in 2017-18 :

	Ministry/Department	2017-18
20	MINISTRY OF FISHERIES, ANIMAL HUSBANDRY AND DA…	740168.99
19	MINISTRY OF FINANCE	740168.99
12	MINISTRY OF DEFENCE	359854.12
9	MINISTRY OF COOPERATION	154231.69
8	MINISTRY OF CONSUMER AFFAIRS, FOOD AND PUBLIC …	154231.69

Bottom 5 Ministries by Budget Allocation in 2017-18 :

	Ministry/Department	2017-18
35	MINISTRY OF PARLIAMENTARY AFFAIRS	17.88
50	MINISTRY OF STEEL	44.14
38	MINISTRY OF PLANNING	252.52
10	MINISTRY OF CORPORATE AFFAIRS	448.04
5	MINISTRY OF COAL	745.10

Top 5 Ministries by Budget Allocation in 2016-17:

	Ministry/Department	2016-17
20	MINISTRY OF FISHERIES, ANIMAL HUSBANDRY AND DA…	723460.84
19	MINISTRY OF FINANCE	723460.84
12	MINISTRY OF DEFENCE	340921.98
8	MINISTRY OF CONSUMER AFFAIRS, FOOD AND PUBLIC …	141391.61
9	MINISTRY OF COOPERATION	141391.61

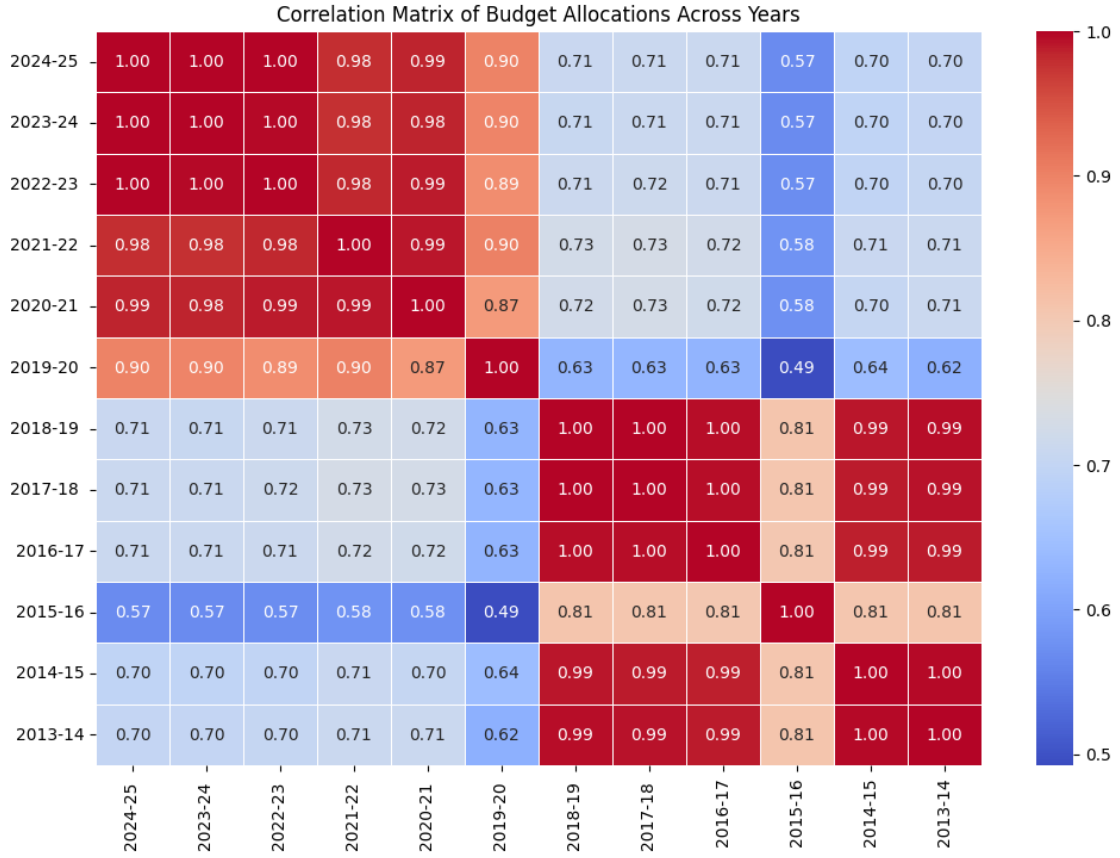
Bottom 5 Ministries by Budget Allocation in 2016-17:

	Ministry/Department	2016-17
35	MINISTRY OF PARLIAMENTARY AFFAIRS	17.30
50	MINISTRY OF STEEL	85.62
38	MINISTRY OF PLANNING	293.14

```
10          MINISTRY OF CORPORATE AFFAIRS   344.43
22  MINISTRY OF HEALTH AND FAMILY WELFARE   636.02
-------------------------------------------------

Top 5 Ministries by Budget Allocation in 2015-16:
                                  Ministry/Department    2015-16
21             MINISTRY OF FOOD PROCESSING INDUSTRIES  679960.98
20  MINISTRY OF FISHERIES, ANIMAL HUSBANDRY AND DA…  679960.98
19                                MINISTRY OF FINANCE  679960.98
12                                MINISTRY OF DEFENCE  310079.60
8   MINISTRY OF CONSUMER AFFAIRS, FOOD AND PUBLIC …  125473.77

Bottom 5 Ministries by Budget Allocation in 2015-16:
                     Ministry/Department  2015-16
35     MINISTRY OF PARLIAMENTARY AFFAIRS    15.57
50                     MINISTRY OF STEEL    82.50
34            MINISTRY OF PANCHAYATI RAJ    94.75
10         MINISTRY OF CORPORATE AFFAIRS   271.88
33  MINISTRY OF NEW AND RENEWABLE ENERGY   303.21
-------------------------------------------------

Top 5 Ministries by Budget Allocation in 2014-15:
                                  Ministry/Department    2014-15
20  MINISTRY OF FISHERIES, ANIMAL HUSBANDRY AND DA…  682345.00
19                                MINISTRY OF FINANCE  682345.00
12                                MINISTRY OF DEFENCE  218654.64
8   MINISTRY OF CONSUMER AFFAIRS, FOOD AND PUBLIC …  126594.34
9                            MINISTRY OF COOPERATION  126594.34

Bottom 5 Ministries by Budget Allocation in 2014-15:
                                  Ministry/Department  2014-15
35                  MINISTRY OF PARLIAMENTARY AFFAIRS    14.35
50                                    MINISTRY OF STEEL   118.97
10                       MINISTRY OF CORPORATE AFFAIRS   255.25
21             MINISTRY OF FOOD PROCESSING INDUSTRIES   785.86
36  MINISTRY OF PERSONNEL, PUBLIC GRIEVANCES AND P…  1090.41
-------------------------------------------------

Top 5 Ministries by Budget Allocation in 2013-14:
                                  Ministry/Department    2013-14
19                                MINISTRY OF FINANCE  673885.25
20  MINISTRY OF FISHERIES, ANIMAL HUSBANDRY AND DA…  673885.25
12                                MINISTRY OF DEFENCE  271076.13
44                     MINISTRY OF RURAL DEVELOPMENT  113304.85
9                            MINISTRY OF COOPERATION  102331.34

Bottom 5 Ministries by Budget Allocation in 2013-14:
                     Ministry/Department  2013-14
```

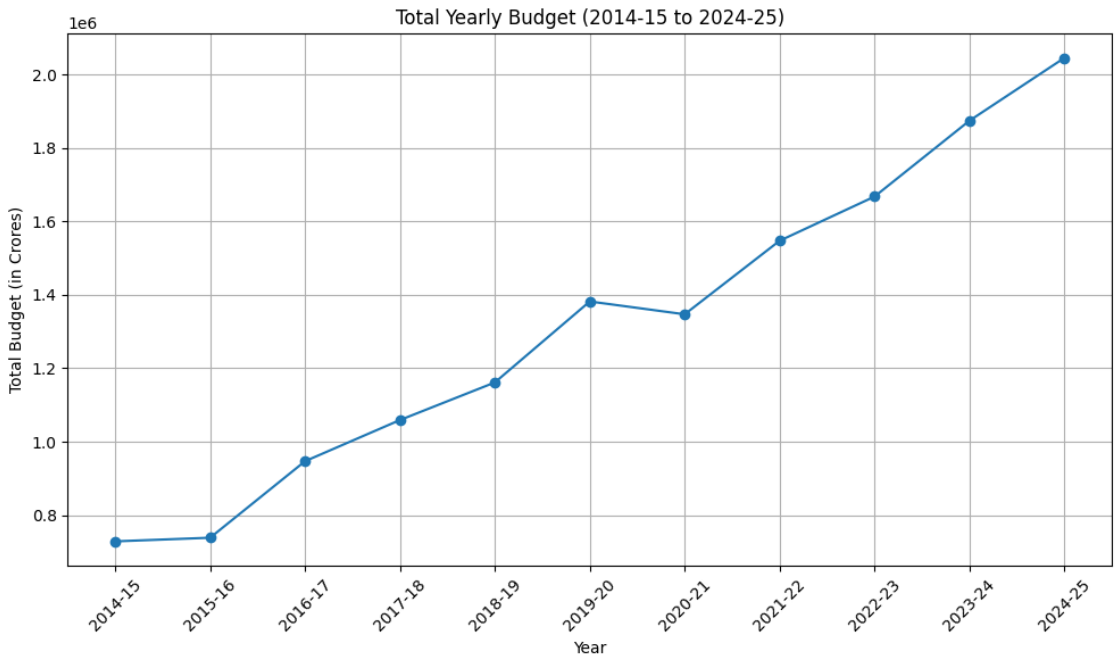
```
35       MINISTRY OF PARLIAMENTARY AFFAIRS    13.28
50                          MINISTRY OF STEEL    92.92
10              MINISTRY OF CORPORATE AFFAIRS   255.28
5                            MINISTRY OF COAL   547.70
21  MINISTRY OF FOOD PROCESSING INDUSTRIES   719.11
--------------------------------------------------
```

[39]:
```
numeric_data = data_cleaned.drop('Ministry/Department', axis=1)

# Compute the correlation matrix
corr_matrix = numeric_data.corr()

# Plot the heatmap using Seaborn
plt.figure(figsize=(12, 8))
sns.heatmap(corr_matrix, annot=True, cmap='coolwarm', fmt='.2f', linewidths=0.5)
plt.title('Correlation Matrix of Budget Allocations Across Years')
plt.show()
```



[43]:
```
years = [
    '2014-15', '2015-16', '2016-17', '2017-18',
```

```
    '2018-19', '2019-20', '2020-21', '2021-22',
    '2022-23', '2023-24', '2024-25'
]
total_budget = [
    728827.07, 738695.09, 947108.94, 1059176.64,
    1161571.66, 1382042.21, 1347079.80, 1547276.05,
    1667592.65, 1874141.24, 2045113.48
]

plt.figure(figsize=(10, 6))
plt.plot(years, total_budget, marker='o')
plt.title('Total Yearly Budget (2014-15 to 2024-25)')
plt.xlabel('Year')
plt.ylabel('Total Budget (in Crores)')
plt.xticks(rotation=45)
plt.grid()
plt.tight_layout()
plt.show()
```

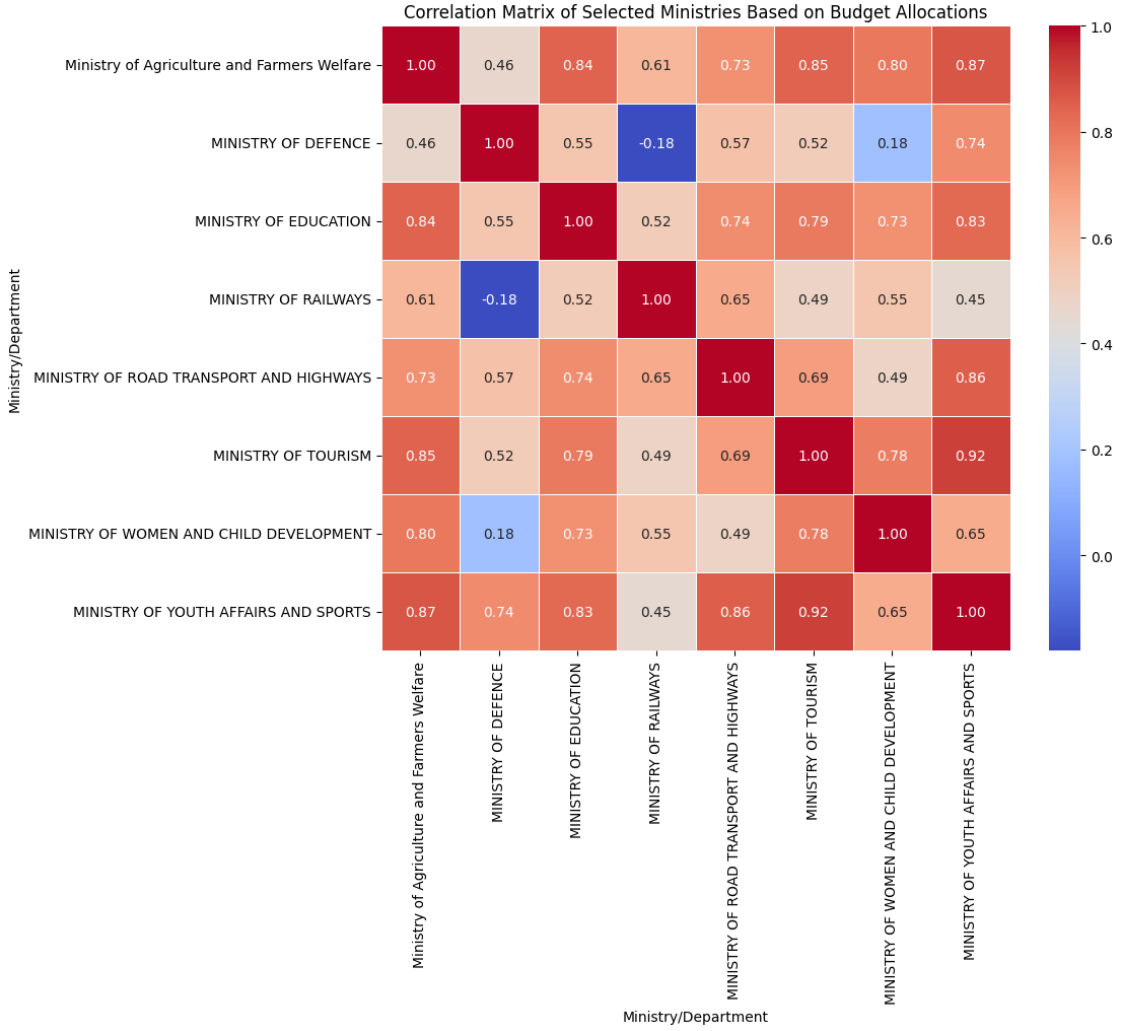


[16]:
```
selected_ministries = [
    'Ministry of Agriculture and Farmers Welfare',
    'MINISTRY OF DEFENCE',
    'MINISTRY OF EDUCATION',
    'MINISTRY OF RAILWAYS',
    'MINISTRY OF ROAD TRANSPORT AND HIGHWAYS',
```

```
    'MINISTRY OF TOURISM',
    'MINISTRY OF WOMEN AND CHILD DEVELOPMENT',
    'MINISTRY OF YOUTH AFFAIRS AND SPORTS'
]

# Check available columns to ensure proper filtering
print("Available ministries:", data_cleaned['Ministry/Department'].unique())

# Filter the DataFrame for selected ministries
filtered_data = data_cleaned[data_cleaned['Ministry/Department'].
 ↪isin(selected_ministries)]

# Set 'Ministry/Department' as the index and drop it for numeric calculations
ministry_data = filtered_data.set_index('Ministry/Department').T

# Compute the correlation matrix for selected ministries
ministry_corr_matrix = ministry_data.corr()

# Plot the heatmap using Seaborn
plt.figure(figsize=(10, 8))
sns.heatmap(ministry_corr_matrix, annot=True, cmap='coolwarm', fmt='.2f',␣
 ↪linewidths=0.5)
plt.title('Correlation Matrix of Selected Ministries Based on Budget␣
 ↪Allocations')
plt.show()
```

```
Available ministries: ['Ministry of Agriculture and Farmers Welfare'
 'DEPARTMENT OF ATOMIC ENERGY' 'MINISTRY OF AYUSH'
 'MINISTRY OF CHEMICALS AND FERTILISERS' 'MINISTRY OF CIVIL AVIATION '
 'MINISTRY OF COAL' 'MINISTRY OF COMMERCE AND INDUSTRY'
 'MINISTRY OF COMMUNICATIONS'
 'MINISTRY OF CONSUMER AFFAIRS, FOOD AND PUBLIC DISTRIBUTION'
 'MINISTRY OF COOPERATION' 'MINISTRY OF CORPORATE AFFAIRS'
 'MINISTRY OF CULTURE' 'MINISTRY OF DEFENCE'
 'MINISTRY OF DEVELOPMENT OF NORTH EASTERN REGION'
 'MINISTRY OF EARTH SCIENCES' 'MINISTRY OF EDUCATION'
 'MINISTRY OF ELECTRONICS AND INFORMATION TECHNOLOGY'
 'MINISTRY OF ENVIRONMENT, FORESTS AND CLIMATE CHANGE'
 'MINISTRY OF EXTERNAL AFFAIRS' 'MINISTRY OF FINANCE'
 'MINISTRY OF FISHERIES, ANIMAL HUSBANDRY AND DAIRYING'
 'MINISTRY OF FOOD PROCESSING INDUSTRIES'
 'MINISTRY OF HEALTH AND FAMILY WELFARE' 'MINISTRY OF HEAVY INDUSTRIES'
 'MINISTRY OF HOME AFFAIRS' 'MINISTRY OF HOUSING AND URBAN AFFAIRS'
 'MINISTRY OF INFORMATION AND BROADCASTING' 'MINISTRY OF JAL SHAKTI'
 'MINISTRY OF LABOUR AND EMPLOYMENT' 'MINISTRY OF LAW AND JUSTICE'
 'MINISTRY OF MICRO, SMALL AND MEDIUM ENTERPRISES' 'MINISTRY OF MINES'
 'MINISTRY OF MINORITY AFFAIRS' 'MINISTRY OF NEW AND RENEWABLE ENERGY'
```

```
 'MINISTRY OF PANCHAYATI RAJ' 'MINISTRY OF PARLIAMENTARY AFFAIRS'
 'MINISTRY OF PERSONNEL, PUBLIC GRIEVANCES AND PENSIONS'
 'MINISTRY OF PETROLEUM AND NATURAL GAS' 'MINISTRY OF PLANNING'
 'MINISTRY OF PORTS, SHIPPING AND WATERWAYS' 'MINISTRY OF POWER'
 'THE PRESIDENT, PARLIAMENT, UNION PUBLIC SERVICE COMMISSION AND THE SECRETARIAT
OF THE VICE PRESIDENT'
 'MINISTRY OF RAILWAYS' 'MINISTRY OF ROAD TRANSPORT AND HIGHWAYS'
 'MINISTRY OF RURAL DEVELOPMENT' 'MINISTRY OF SCIENCE AND TECHNOLOGY'
 'MINISTRY OF SKILL DEVELOPMENT AND ENTREPRENEURSHIP'
 'MINISTRY OF SOCIAL JUSTICE AND EMPOWERMENT' 'DEPARTMENT OF SPACE'
 'MINISTRY OF STATISTICS AND PROGRAMME IMPLEMENTATION' 'MINISTRY OF STEEL'
 'MINISTRY OF TEXTILES' 'MINISTRY OF TOURISM' 'MINISTRY OF TRIBAL AFFAIRS'
 'MINISTRY OF WOMEN AND CHILD DEVELOPMENT'
 'MINISTRY OF YOUTH AFFAIRS AND SPORTS']
```



[20]:
```
csv_file_name = 'cleaned_data.csv'

# Save the DataFrame to a CSV file
data_cleaned.to_csv(csv_file_name)

print(f"DataFrame saved to {csv_file_name}")
files.download('cleaned_data.csv')
```

```
DataFrame saved to cleaned_data.csv
```

```
<IPython.core.display.Javascript object>
```

```
<IPython.core.display.Javascript object>
```

[21]:
```
uploaded = files.upload()
```

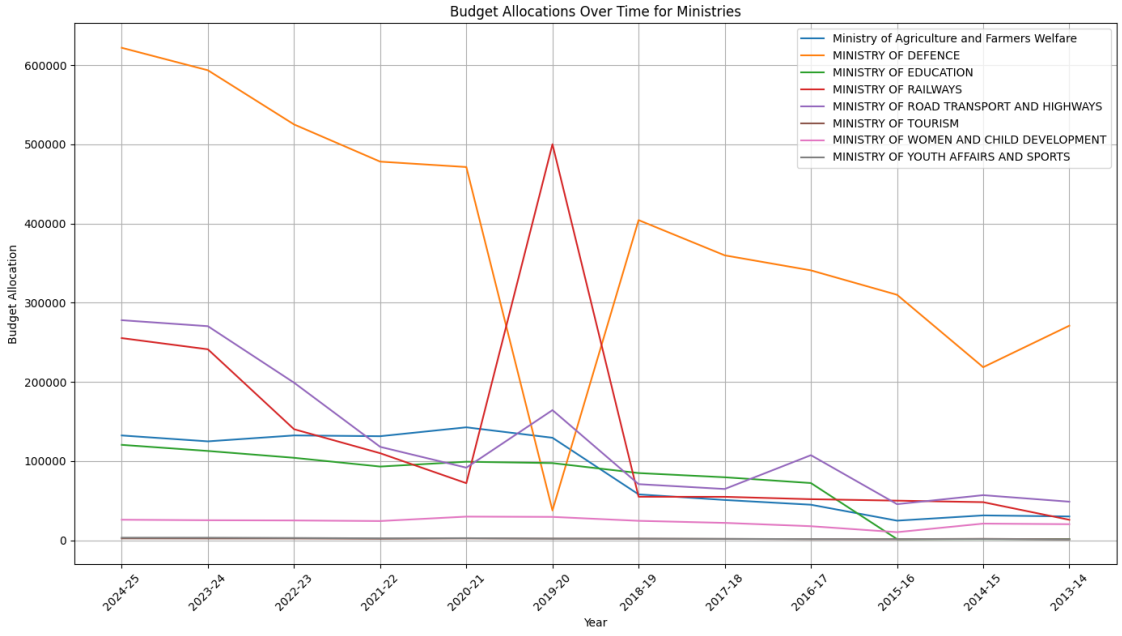
```
<IPython.core.display.HTML object>
```

```
Saving cleaned_data.csv to cleaned_data (1).csv
```

[22]:
```
data = {
    "Ministry/Department": [
        "Ministry of Agriculture and Farmers Welfare",
        "MINISTRY OF DEFENCE",
        "MINISTRY OF EDUCATION",
        "MINISTRY OF RAILWAYS",
        "MINISTRY OF ROAD TRANSPORT AND HIGHWAYS",
        "MINISTRY OF TOURISM",
        "MINISTRY OF WOMEN AND CHILD DEVELOPMENT",
        "MINISTRY OF YOUTH AFFAIRS AND SPORTS"
    ],
    "2024-25": [132469.86, 621940.95, 120627.87, 255393, 278000, 2479.62, 26092.
↪19, 3442.32],
    "2023-24": [125035.79, 593537.64, 112899.47, 241267.51, 270434.71, 2400,␣
↪25448.75, 3397.32],
    "2022-23": [132513.62, 525166.15, 104277.72, 140367.13, 199107.71, 2400,␣
↪25172.28, 3062.6],
    "2021-22": [131531.19, 478195.62, 93224.31, 110054.64, 118101, 2026.77,␣
↪24435, 2596.14],
    "2020-21": [142762.35, 471378, 99311.52, 72215.63, 91823.22, 2499.83, 30007.
↪1, 2826.92],
    "2019-20": [129585.21, 37827.16, 97585.76, 500140.23, 164448.98, 2189.22,␣
↪29664.9, 2216.92],
    "2018-19": [58080, 404364.71, 85010.29, 55088, 71000, 2150, 24700, 2196.35],
    "2017-18": [51026, 359854.12, 79685.95, 55000, 64900, 1840.77, 22094.67,␣
↪1943.21],
    "2016-17": [45035.2, 340921.98, 72394, 52013, 107576, 1590.32, 17908.12,␣
↪1592],
```

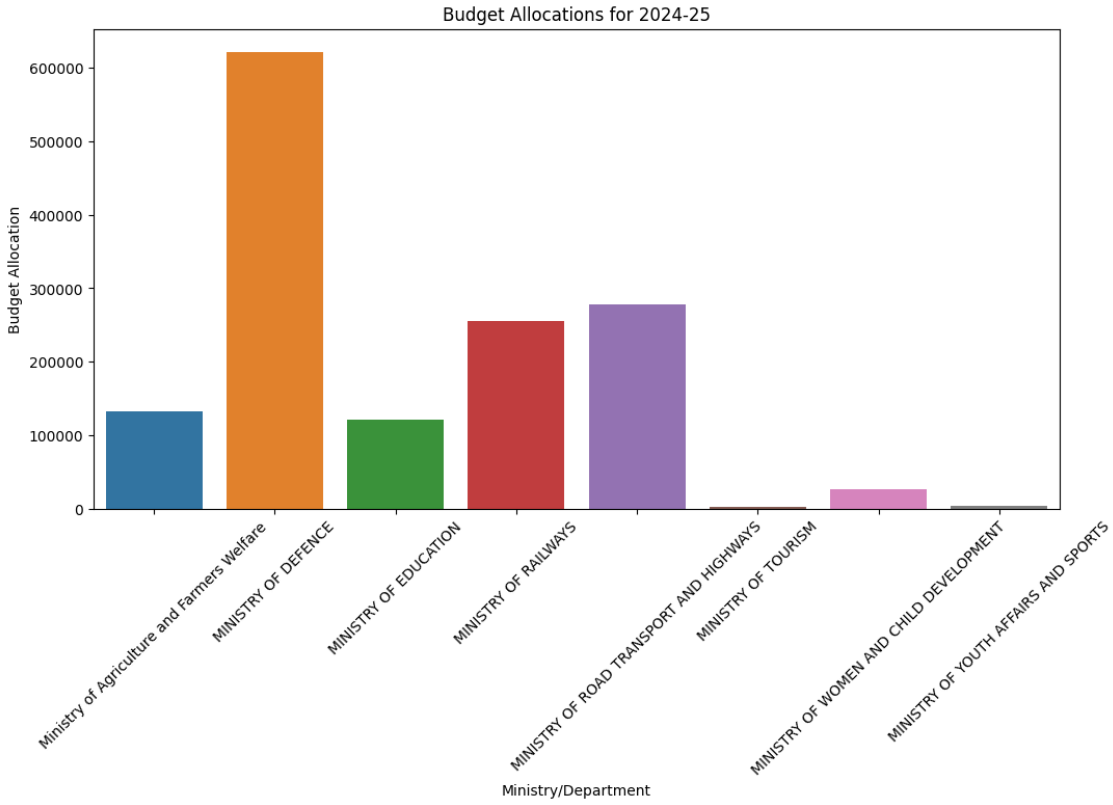
```
    "2015-16": [24909.78, 310079.6, 1619.7, 50175, 45751.65, 1573.07, 10382.4,␣
 ↪1541.13],
    "2014-15": [31542.95, 218654.64, 1702.23, 48262, 57095.64, 1966.71, 21193.
 ↪88, 1769],
    "2013-14": [30223.88, 271076.13, 1693.73, 26000, 48866.23, 1357.3, 20440,␣
 ↪1219]
}

data_cleaned = pd.DataFrame(data)

# Set 'Ministry/Department' as the index
data_cleaned.set_index('Ministry/Department', inplace=True)

# Transpose the DataFrame for easier plotting
ministry_data = data_cleaned.T
```

[24]:
```
plt.figure(figsize=(14, 8))
for ministry in ministry_data.columns:
    plt.plot(ministry_data.index, ministry_data[ministry], label=ministry)

plt.title('Budget Allocations Over Time for Ministries')
plt.xlabel('Year')
plt.ylabel('Budget Allocation')
plt.xticks(rotation=45)
plt.legend()
plt.grid()
plt.tight_layout()
plt.show()
```



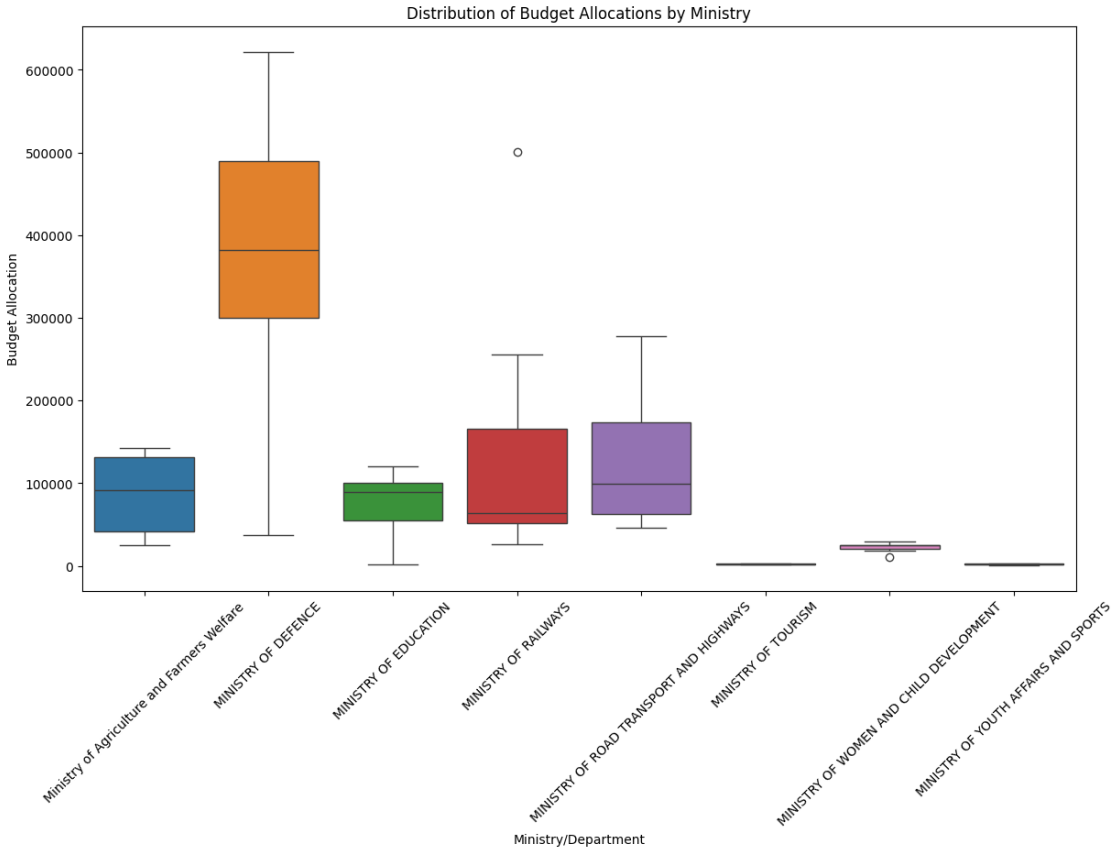
[26]:
```
plt.figure(figsize=(12, 6))

# Create a color palette
palette = sns.color_palette("tab10", len(ministry_data.columns))

# Plot the bar chart with different colors
sns.barplot(x=ministry_data.columns, y=ministry_data.loc['2024-25'],␣
 ↪palette=palette)

plt.title('Budget Allocations for 2024-25')
plt.xlabel('Ministry/Department')
plt.ylabel('Budget Allocation')
plt.xticks(rotation=45)
plt.show()
```

```
<ipython-input-26-78d8e872542b>:7: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same
effect.

  sns.barplot(x=ministry_data.columns, y=ministry_data.loc['2024-25'],
palette=palette)
```

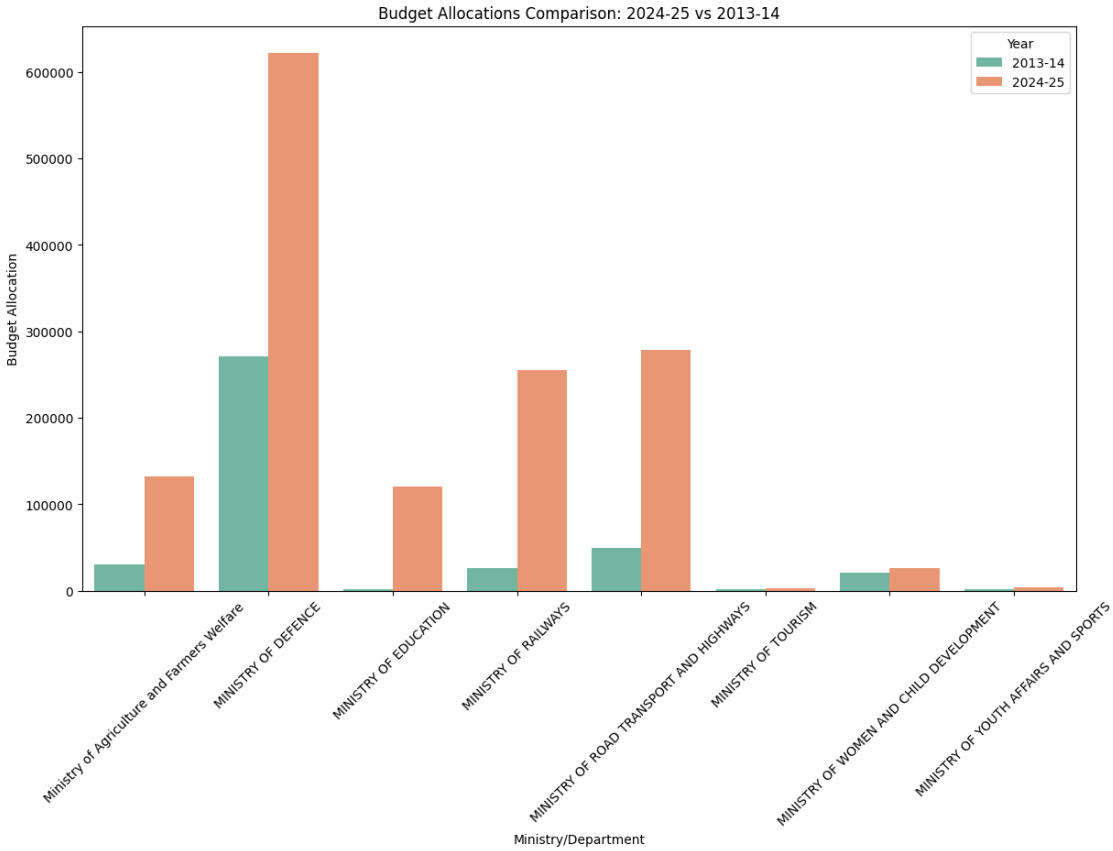


[28]:
```
plt.figure(figsize=(14, 8))
sns.boxplot(data=melted_data, x='Ministry/Department', y='Budget Allocation',␣
 ↪palette=palette)

plt.xticks(rotation=45)
plt.title('Distribution of Budget Allocations by Ministry')
plt.xlabel('Ministry/Department')
plt.ylabel('Budget Allocation')
plt.show()
```

```
<ipython-input-28-b4d4c4f371bc>:2: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same
effect.

  sns.boxplot(data=melted_data, x='Ministry/Department', y='Budget Allocation',
palette=palette)
```



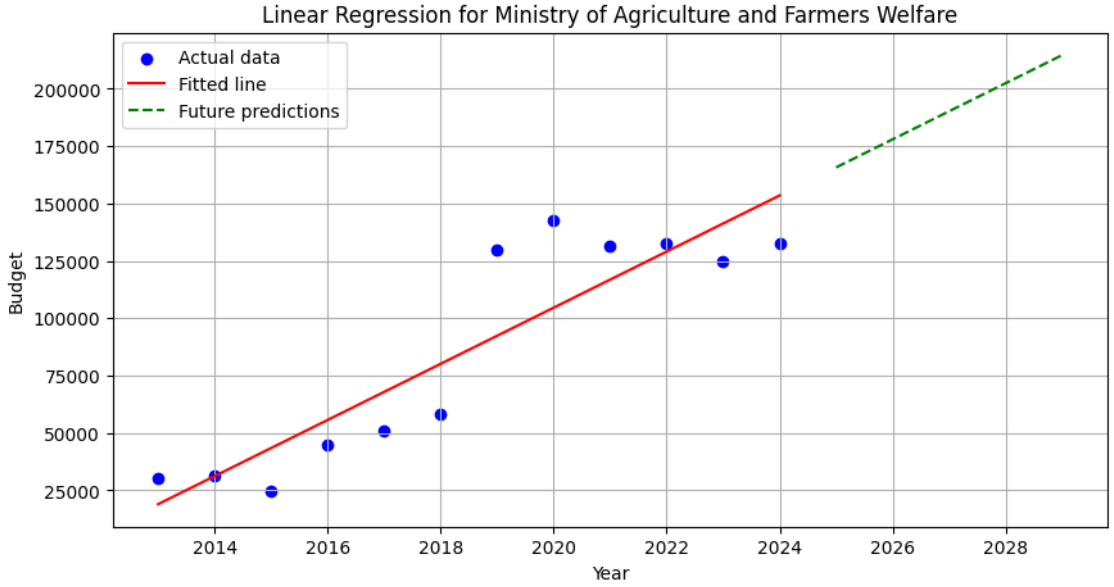
[29]:
```
# Extract budget allocations for the years 2024-25 and 2013-14
comparison_data = data_cleaned.loc[:, ['2013-14', '2024-25']]

# Transpose the DataFrame for easier plotting
comparison_data = comparison_data.reset_index().melt(id_vars='Ministry/
 ↪Department', var_name='Year', value_name='Budget Allocation')

# Set up the bar plot
plt.figure(figsize=(14, 8))
sns.barplot(data=comparison_data, x='Ministry/Department', y='Budget␣
 ↪Allocation', hue='Year', palette='Set2')

plt.title('Budget Allocations Comparison: 2024-25 vs 2013-14')
plt.xlabel('Ministry/Department')
plt.ylabel('Budget Allocation')
plt.xticks(rotation=45)
plt.legend(title='Year')
plt.show()
```



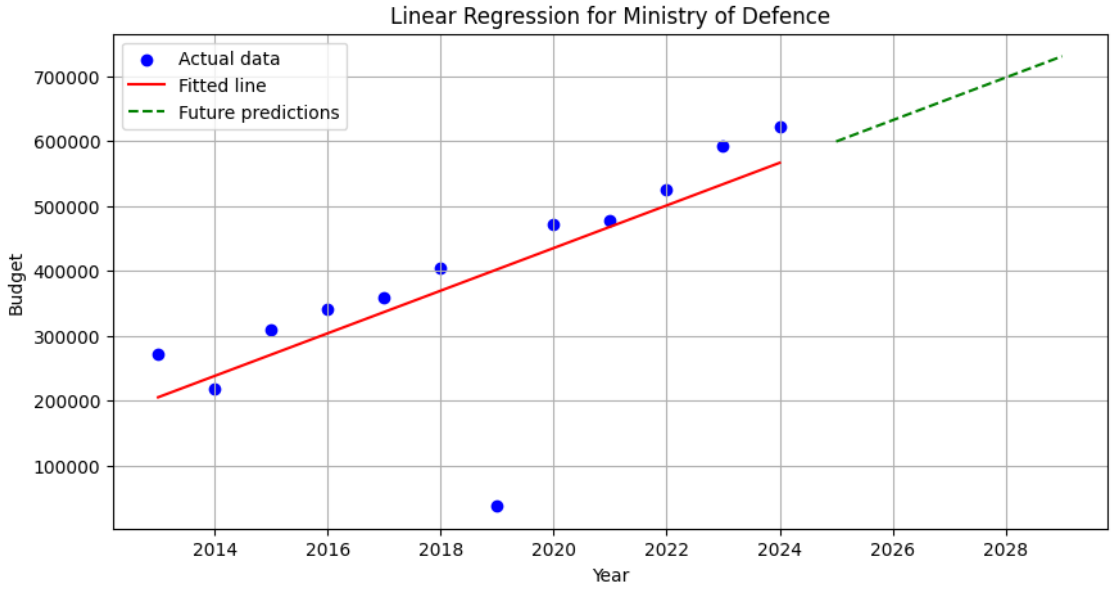
[50]:
```python
import numpy as np
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression

# Function to perform linear regression and plot
def analyze_ministry(years, budgets, ministry_name):
    # Reshape data
    years_reshaped = years.reshape(-1, 1)

    # Fit linear regression model
    model = LinearRegression()
    model.fit(years_reshaped, budgets)

    # Predictions for existing years
    predictions = model.predict(years_reshaped)

    # Prepare future years for predictions
    future_years = np.array([2025, 2026, 2027, 2028, 2029]).reshape(-1, 1)
    future_predictions = model.predict(future_years)
```

```
    # Plotting
    plt.figure(figsize=(10, 5))
    plt.scatter(years, budgets, color='blue', label='Actual data')
    plt.plot(years, predictions, color='red', label='Fitted line')
    plt.plot(future_years, future_predictions, color='green', linestyle='--',␣
 ↪label='Future predictions')
    plt.xlabel('Year')
    plt.ylabel('Budget')
    plt.title(f'Linear Regression for {ministry_name}')
    plt.legend()
    plt.grid()
    plt.show()

    # Coefficients
    slope = model.coef_[0]
    intercept = model.intercept_
    r_squared = model.score(years_reshaped, budgets)

    print(f'{ministry_name} - Slope: {slope}, Intercept: {intercept}, R-squared:
 ↪ {r_squared}')
    print(f'Predicted budgets for the next 5 years: {future_predictions}')

# Years data
years = np.array([2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022,␣
 ↪2023, 2024])

# Ministry budget data
ministry_data = {
    "Ministry of Agriculture and Farmers Welfare": [30223.88, 31542.95, 24909.
 ↪78, 45035.2, 51026, 58080, 129585.21, 142762.35, 131531.19, 132513.62,␣
 ↪125035.79, 132469.86],
    "Ministry of Defence": [271076.13, 218654.64, 310079.6, 340921.98, 359854.
 ↪12, 404364.71, 37827.16, 471378, 478195.62, 525166.15, 593537.64, 621940.95],
    "Ministry of Education": [1693.73, 1702.23, 1619.7, 72394, 79685.95, 85010.
 ↪29, 97585.76, 99311.52, 93224.31, 104277.72, 112899.47, 120627.87],
    "Ministry of Railways": [26000, 48262, 50175, 52013, 55000, 55088, 500140.
 ↪23, 72215.63, 110054.64, 140367.13, 241267.51, 255393],
    "Ministry of Road Transport and Highways": [48866.23, 57095.64, 45751.65,␣
 ↪107576, 64900, 71000, 164448.98, 91823.22, 118101, 199107.71, 270434.71,␣
 ↪278000],
    "Ministry of Tourism": [1357.3, 1966.71, 1573.07, 1590.32, 1840.77, 2150,␣
 ↪2189.22, 2499.83, 2026.77, 2400, 2400, 2479.62],
    "Ministry of Women and Child Development": [20440, 21193.88, 10382.4, 17908.
 ↪12, 22094.67, 24700, 29664.9, 30007.1, 24435, 25172.28, 25448.75, 26092.19],
    "Ministry of Youth Affairs and Sports": [1219, 1769, 1541.13, 1592, 1943.
 ↪21, 2196.35, 2216.92, 2826.92, 2596.14, 3062.6, 3397.32, 3442.32],
```

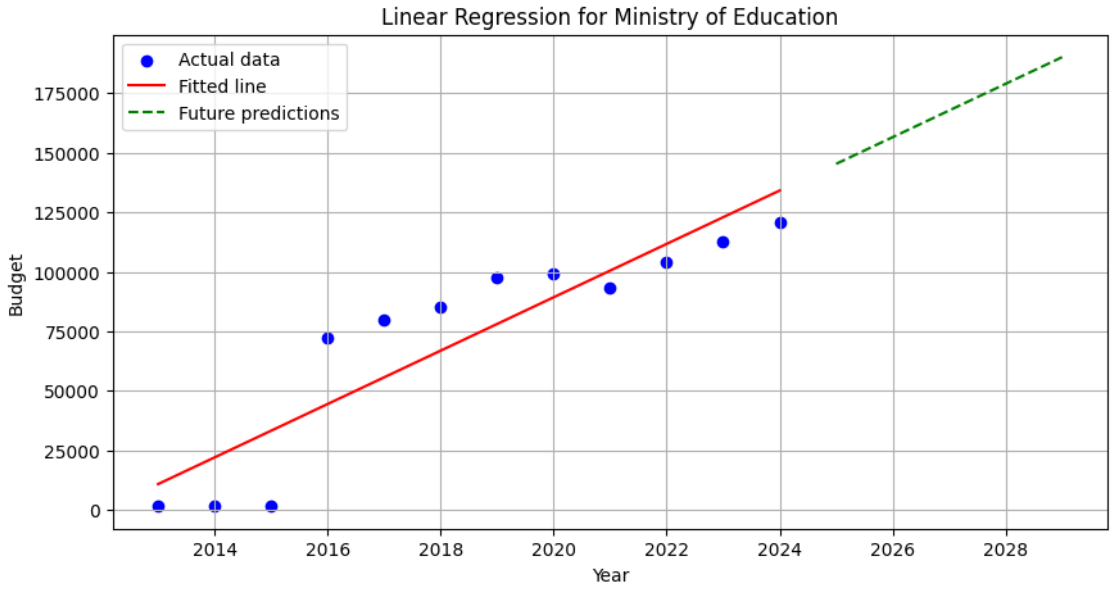
```
    "Ministry of AYUSH": [1259, 1272.15, 1214, 1326.2, 1428.65, 2130.8, 2245.
↪76, 2122.08, 2970.3, 3050, 3647.5, 3712.49],
    "Ministry of External Affairs": [11719, 14730.39, 14966.83, 14662.66, 14798.
↪55, 15011, 20229.4, 17346.71, 18154.73, 17250, 18050, 22154.67],
    "Ministry of Housing and Urban Affairs": [1468.02, 6008.62, 5634.47, 5411,␣
↪6406, 41765.13, 55057.44, 50039.9, 54581, 76549.46, 76431.6, 82576.57],
}

# Analyze each ministry
for ministry, budgets in ministry_data.items():
    analyze_ministry(years, np.array(budgets), ministry)
```




```
Ministry of Agriculture and Farmers Welfare - Slope: 12232.735769230765,
Intercept: -24605550.83102563, R-squared: 0.8065696689322299
Predicted budgets for the next 5 years: [165739.10166667 177971.8374359
190204.57320513 202437.30897436
 214670.04474359]
```

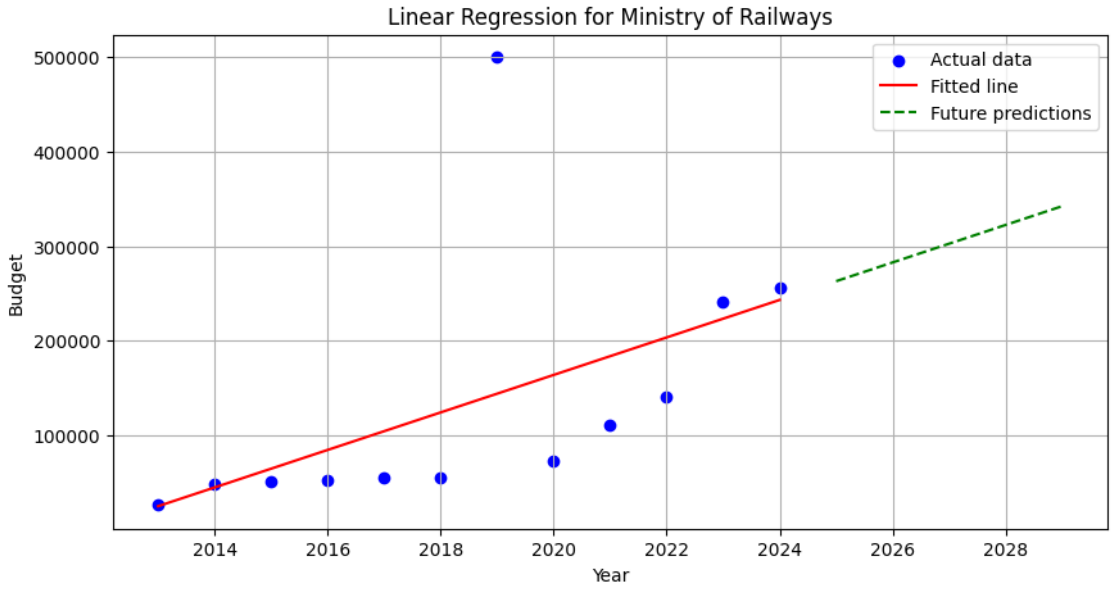


Ministry of Defence - Slope: 32844.29426573426, Intercept: -65910124.91705127, R-squared: 0.5055254233166893
Predicted budgets for the next 5 years: [599570.9710606 632415.26532634
665259.55959207 698103.8538578
 730948.14812354]

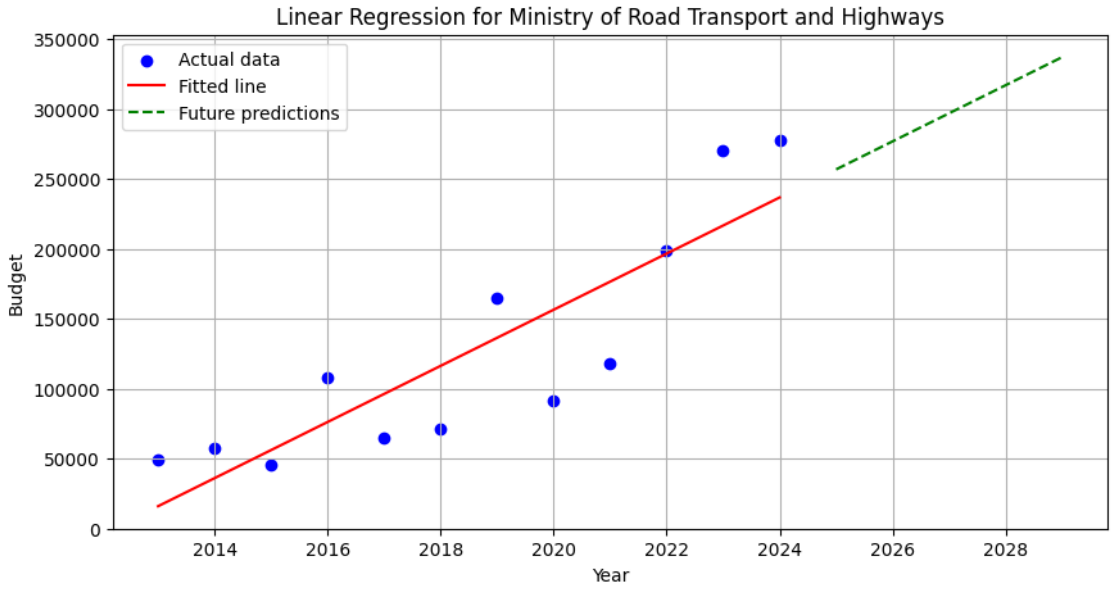


Ministry of Education - Slope: 11200.211783216777, Intercept: -22535124.771923065, R-squared: 0.815616689930376

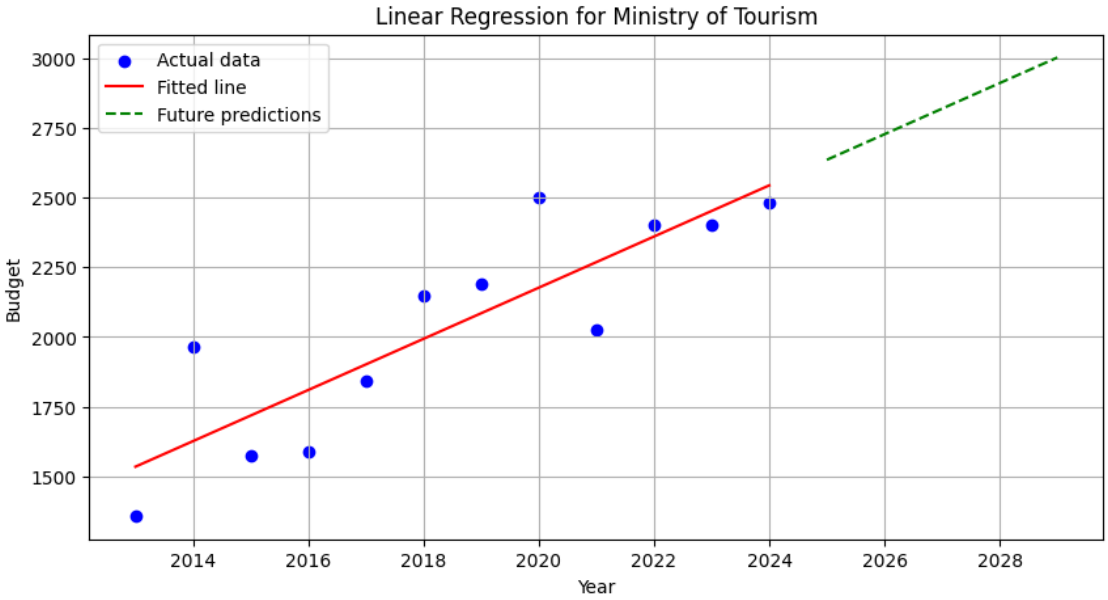
```
Predicted budgets for the next 5 years: [145304.08909091 156504.30087413
167704.51265734 178904.72444056
 190104.93622378]
```



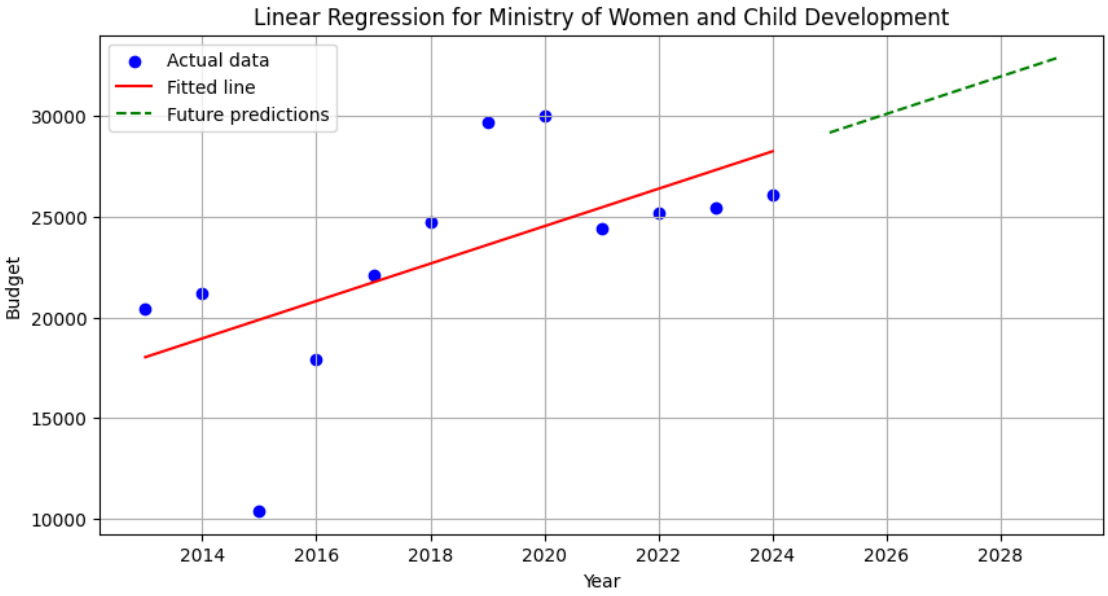

```
Ministry of Railways - Slope: 19855.33153846153, Intercept: -39944155.3653846,
R-squared: 0.268501069291041
Predicted budgets for the next 5 years: [262891.         282746.33153846
302601.66307692 322456.99461538
 342312.32615384]
```



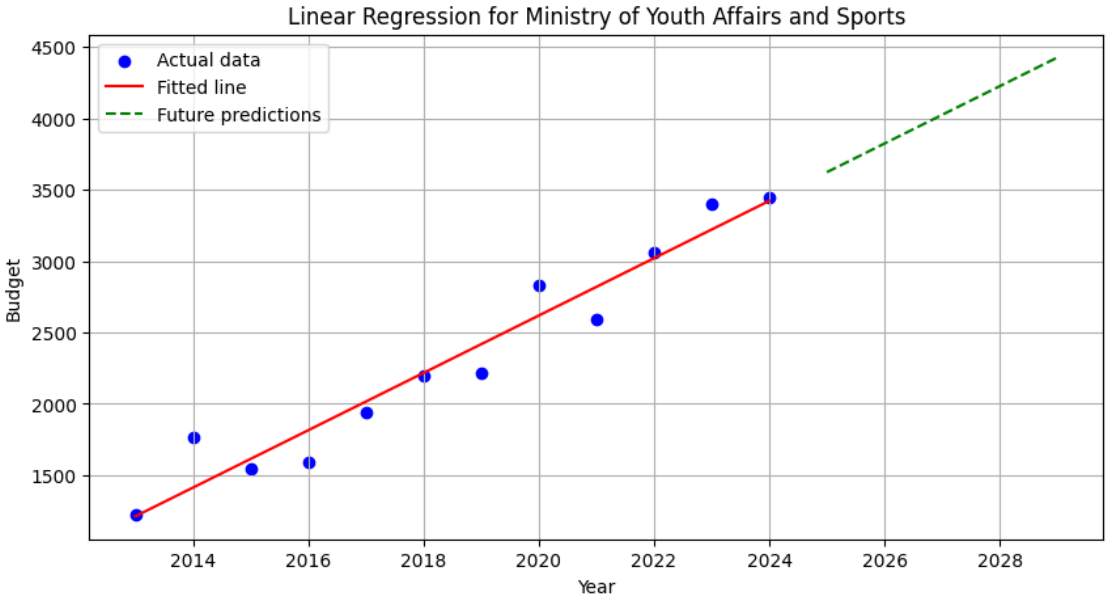
Ministry of Road Transport and Highways - Slope: 20072.93412587412, Intercept: -40390792.10474358, R-squared: 0.755629288370911
Predicted budgets for the next 5 years: [256899.50015152 276972.43427739 297045.36840326 317118.30252913
 337191.23665501]



Ministry of Tourism - Slope: 91.72129370629366, Intercept: -183099.96384615375, R-squared: 0.7381335865540022
Predicted budgets for the next 5 years: [2635.65590909 2727.3772028 2819.0984965 2910.81979021 3002.54108392]

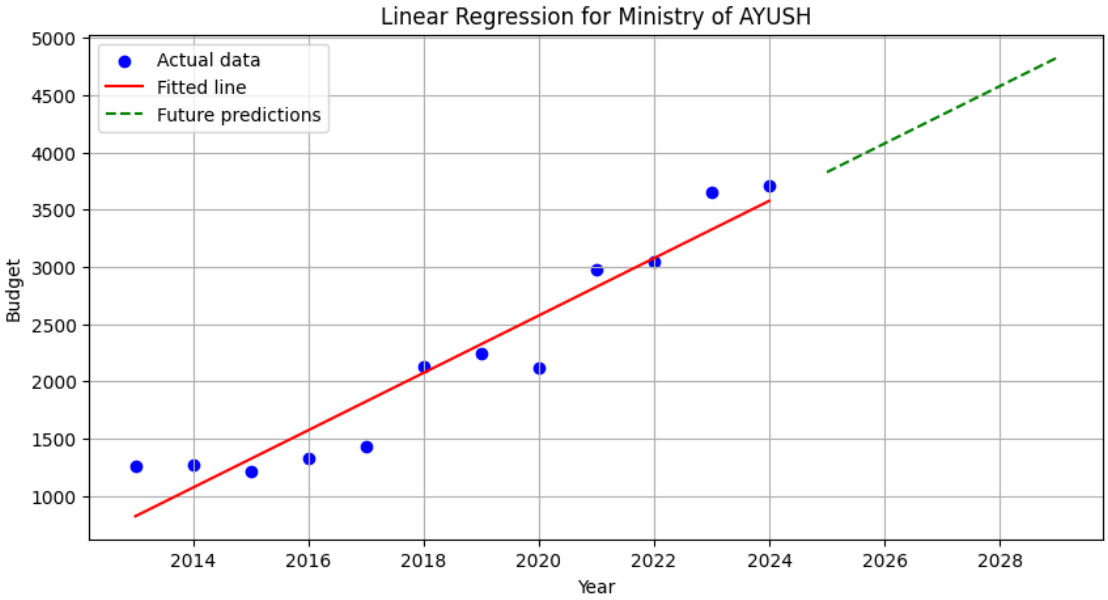


Ministry of Women and Child Development - Slope: 927.7401048951044, Intercept: -1849515.1275641017, R-squared: 0.39158241761222856
Predicted budgets for the next 5 years: [29158.58484848 30086.32495338 31014.06505827 31941.80516317
 32869.54526807]

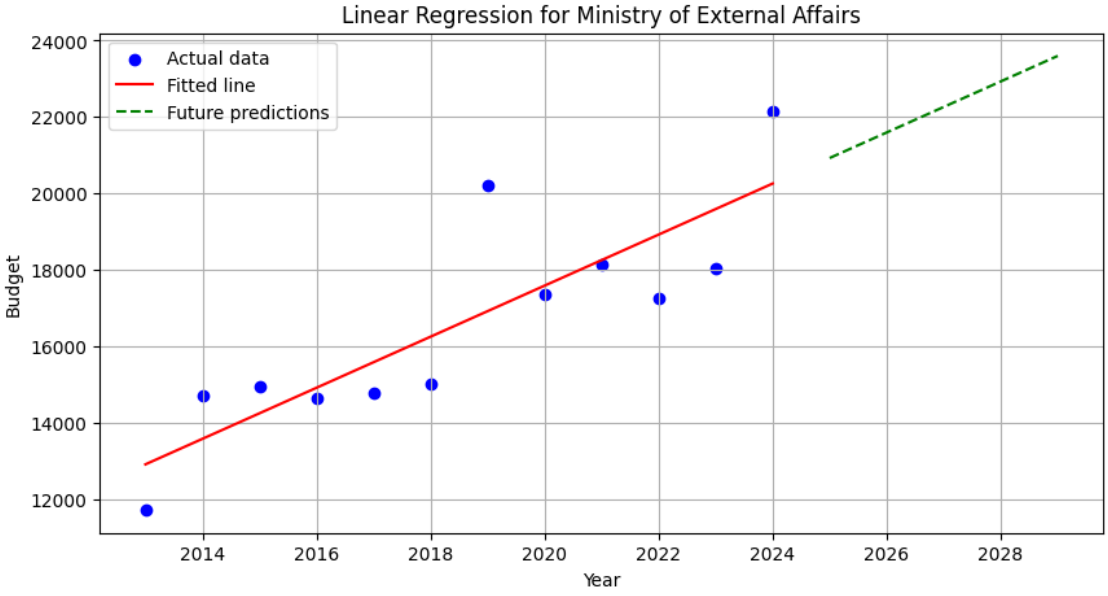


Ministry of Youth Affairs and Sports - Slope: 200.88842657342647, Intercept: -403176.37987179466, R-squared: 0.9421786644943798

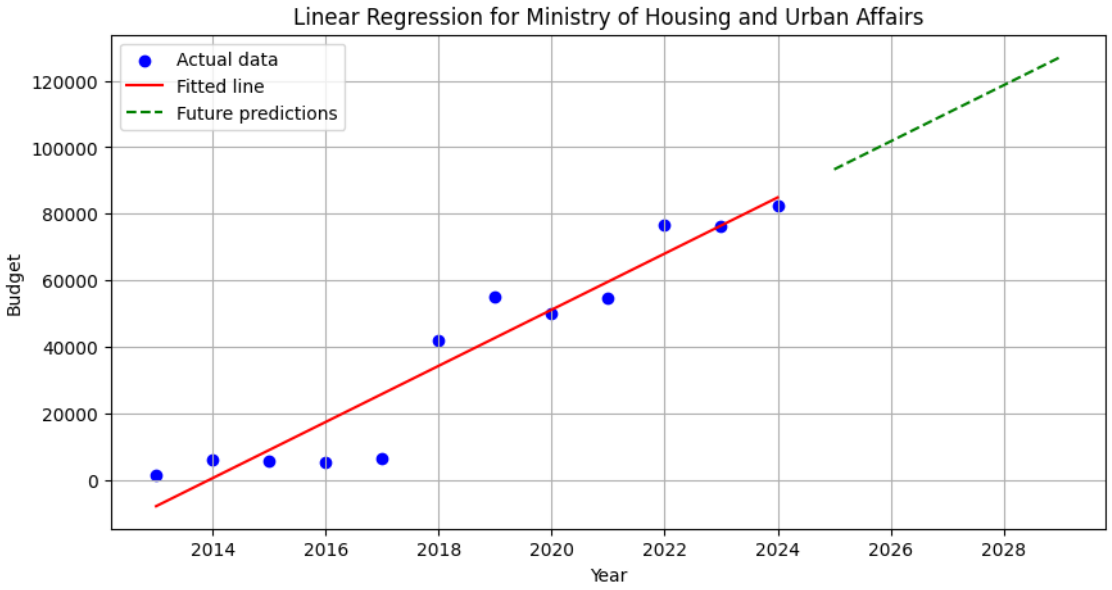
Predicted budgets for the next 5 years: [3622.68393939 3823.57236597
4024.46079254 4225.34921911 4426.23764569]



Ministry of AYUSH - Slope: 250.4695454545454, Intercept: -503374.53333333327,
R-squared: 0.9164707208460072
Predicted budgets for the next 5 years: [3826.29621212 4076.76575758
4327.23530303 4577.70484848 4828.17439394]



```
Ministry of External Affairs - Slope: 667.7422377622376, Intercept:
-1331248.2119230763, R-squared: 0.716126862504495
Predicted budgets for the next 5 years: [20929.81954545 21597.56178322
22265.30402098 22933.04625874
 23600.7884965 ]
```




```
Ministry of Housing and Urban Affairs - Slope: 8435.139195804195, Intercept:
-16987834.365897432, R-squared: 0.9135103673368953
Predicted budgets for the next 5 years: [ 93322.50560606 101757.64480187
110192.78399767 118627.92319348
 127063.06238928]
```