Digital Egypt Pioneers

HR Data Analysis

Presentation by Team3

5th September, 2025
Graduation Project

TEAM MEMBERS

Digital Egypt Pioneers

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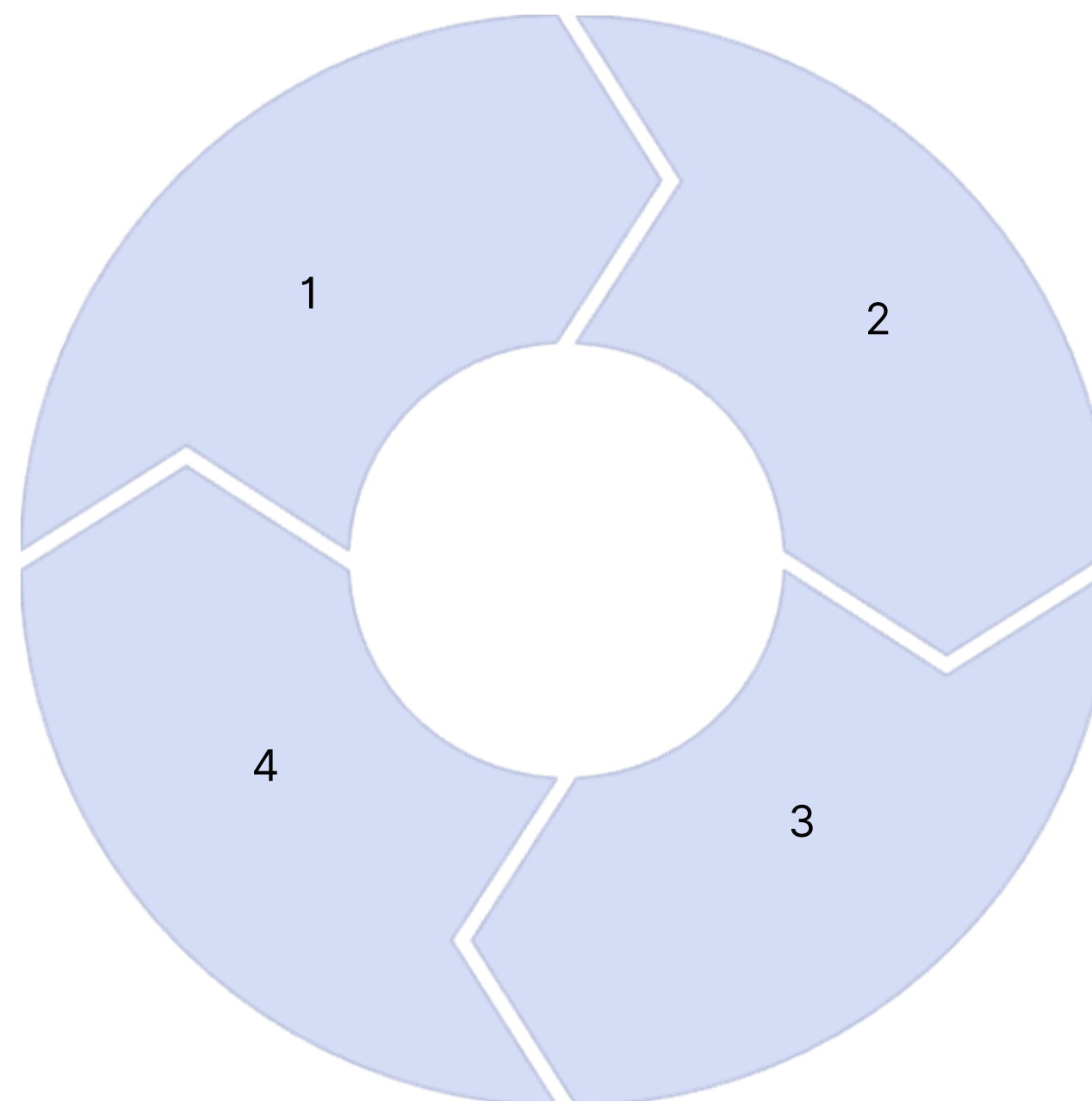LinkedIn

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Understanding the Dataset
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relationships.

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Ensuring no redundant records

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Filling or removing missing value

Handling Outliers
Identifying and treating extreme
values

1

2

3

4

Information about dataset

Total rows & column
3000 Row & 37 column

Data type
Date time:4 column float:2 column int64:8 column
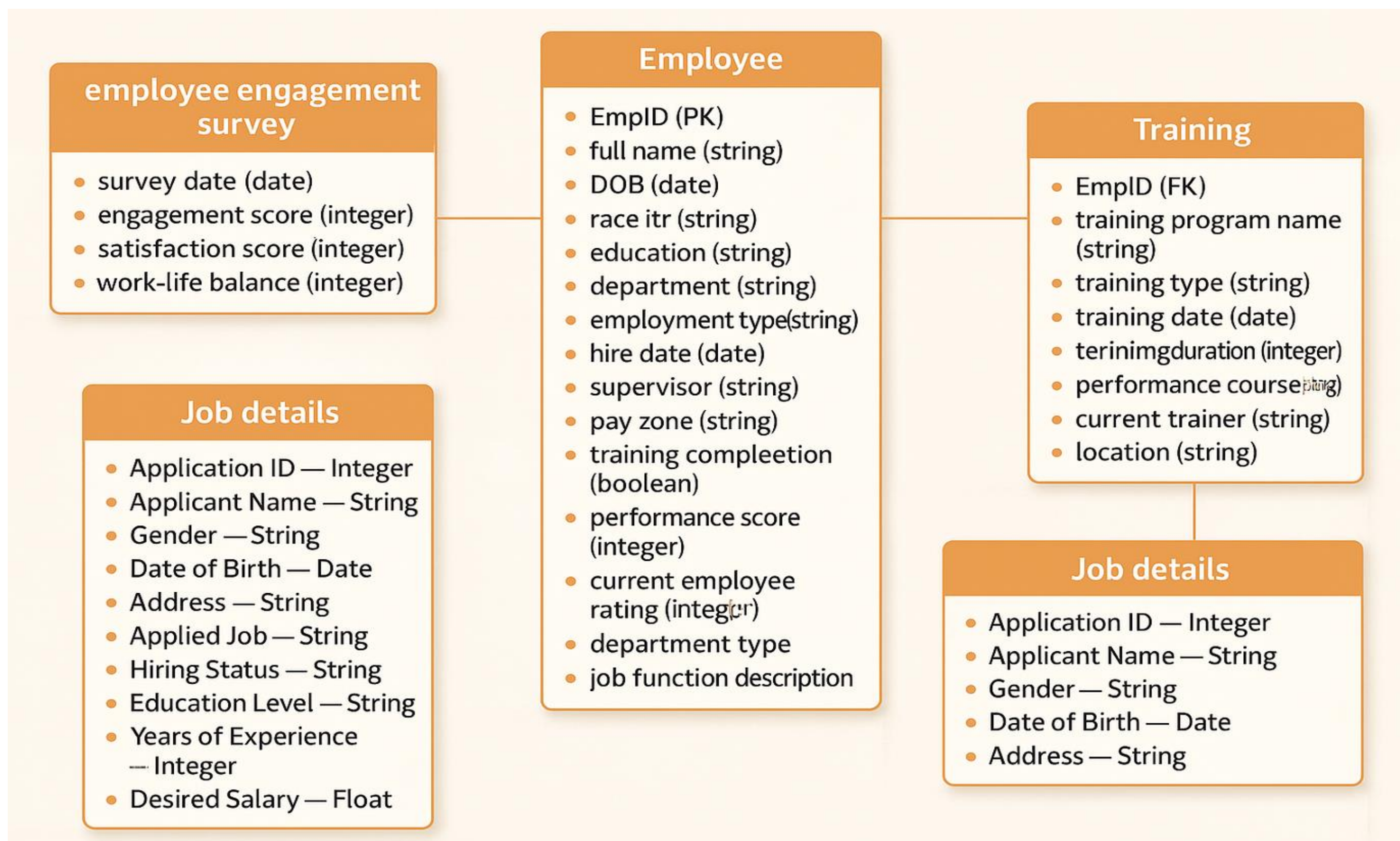object:23 column

memory usage
867.3+ KB

Entity Relationship Digram

Database Schema Implementation

employee engagement survey

- survey date (date)
- engagement score (integer)
- satisfaction score (integer)
- work-life balance (integer)

Employee

- EmpID (PK)
- full name (string)
- DOB (date)
- race itr (string)
- education (string)
- department (string)
- employment type(string)
- hire date (date)
- supervisor (string)
- pay zone (string)
- training completeion (boolean)
- performance score (integer)
- current employee rating (integer)
- department type
- job function description

Training

- EmpID (FK)
- training program name (string)
- training type (string)
- training date (date)
- terinimgduration (integer)
- performance course(string)
- current trainer (string)
- location (string)

Job details

- Application ID — Integer
- Applicant Name — String
- Gender — String
- Date of Birth — Date
- Address — String
- Applied Job — String
- Hiring Status — String
- Education Level — String
- Years of Experience — Integer
- Desired Salary — Float

Job details

- Application ID — Integer
- Applicant Name — String
- Gender — String
- Date of Birth — Date
- Address — String

Recommendations

- Improve onboarding to reduce early attrition.
- Support "Fully Meets" performers with growth opportunities.
- Expand training programs to boost retention.
- Revisit targets and incentives in Sales.

- Recognize top performers and retain them.
- Maintain strong performance management systems.
- Create career paths for IT/IS staff.
- Apply tailored strategies for each Pay Zone.

Action Plan

- Enhance onboarding programs to reduce early attrition (0–1 year).
- Assign mentors to new hires for better integration.
- Conduct stay interviews within the first 6 months to address issues early.
- Offer career growth opportunities to "Fully Meets" performers to boost retention.
- Expand training programs and link them to promotions and internal mobility.

- Adjust targets and improve incentives in the Sales department.
- Create clear career paths in the IT/IS department to prevent attrition.
- Zone A: Upskill employees and provide promotion paths.
- Zone B: Define fair and structured promotion processes.
- Zone C: Retain senior employees and prepare successors.
- Recognize and promote top performers in the "Exceeds" category.

Data Cleaning with Python

Removing Duplicates

```
0   Years_of_Experience          3000 non-null   int64
1   Work_Life_Balance_Score      3000 non-null   int64
2   Training_Type                3000 non-null   object
3   Training_Program_Name        3000 non-null   object
4   Training_Outcome             3000 non-null   object
5   Training_Duration            3000 non-null   int64
6   Training_Date                3000 non-null   datetime64[ns]
7   Training_Cost                3000 non-null   float64
8   Trainer                      3000 non-null   object
9   Title                        3000 non-null   object
10  TerminationType              3000 non-null   object
11  Survey_Date                  3000 non-null   datetime64[ns]
12  Supervisor                   3000 non-null   object
13  Status                       3000 non-null   object
14  State                        3000 non-null   object
15  StartDate                    3000 non-null   datetime64[ns]
16  Satisfaction_Score           3000 non-null   int64
17  Race                         3000 non-null   object
18  Performance_Score            3000 non-null   object
19  PayZone                      3000 non-null   object
20  Marital                      3000 non-null   object
21  Location                     3000 non-null   object
22  JobFunctionDescription       3000 non-null   object
23  Job_Title                    3000 non-null   object
24  Gender                       3000 non-null   object
25  ExitDate                     3000 non-null   object
26  Engagement_Score             3000 non-null   int64
27  EmployeeType                 3000 non-null   object
28  EmployeeStatus               3000 non-null   object
29  EmployeeClassificationType   3000 non-null   object
30  employee_full_name           3000 non-null   object
31  EmpID                        3000 non-null   int64
32  Education_Level              3000 non-null   object
33  Desired_Salary               3000 non-null   float64
34  DepartmentType               3000 non-null   object
35  Date_of_birth                3000 non-null   datetime64[ns]
36  Current_Employee_Rating      3000 non-null   int64
dtypes: datetime64[ns](4), float64(2), int64(7), object(24)
memory usage: 867.3+ KB
```

## Handling missing value

```
Missing Values:
Years_of_Experience             0
Work_Life_Balance_Score         0
Training_Type                   0
Training_Program_Name           0
Training_Outcome                0
Training_Duration               0
Training_Date                   0
Training_Cost                   0
Trainer                         0
Title                           0
TerminationType                 0
Survey_Date                     0
Supervisor                      0
Status                          0
State                           0
StartDate                       0
Satisfaction_Score              0
Race                            0
Performance_Score               0
PayZone                         0
Marital                         0
Location                        0
JobFunctionDescription          0
Job_Title                       0
Gender                          0
ExitDate                        0
Engagement_Score                0
EmployeeType                    0
EmployeeStatus                  0
EmployeeClassificationType      0
employee_full_name              0
EmpID                           0
Education_Level                 0
Desired_Salary                  0
```

Checking outliers

```
Outliers detected using IQR:
Years_of_Experience              0
Work_Life_Balance_Score          0
Training_Duration                0
Training_Cost                    0
Satisfaction_Score               0
Engagement_Score                 0
EmpID                            0
Desired_Salary                   0
Current_Employee_Rating        270
dtype: int64
```

Boxplot of Current_Employee_Rating
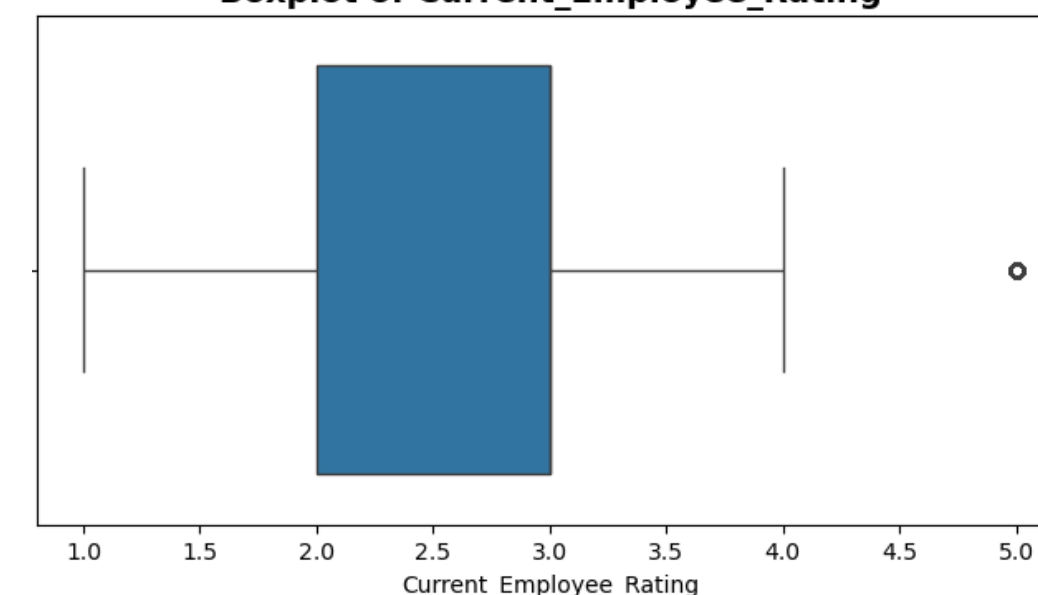
Data analysis & visualization (python)

1 **Training Outcome Distribution**
Most employees successfully complete their training

2 **Salary Distribution**
Shows salary ranges and frequencies across the company

3 **Work-Life Balance vs. Experience**
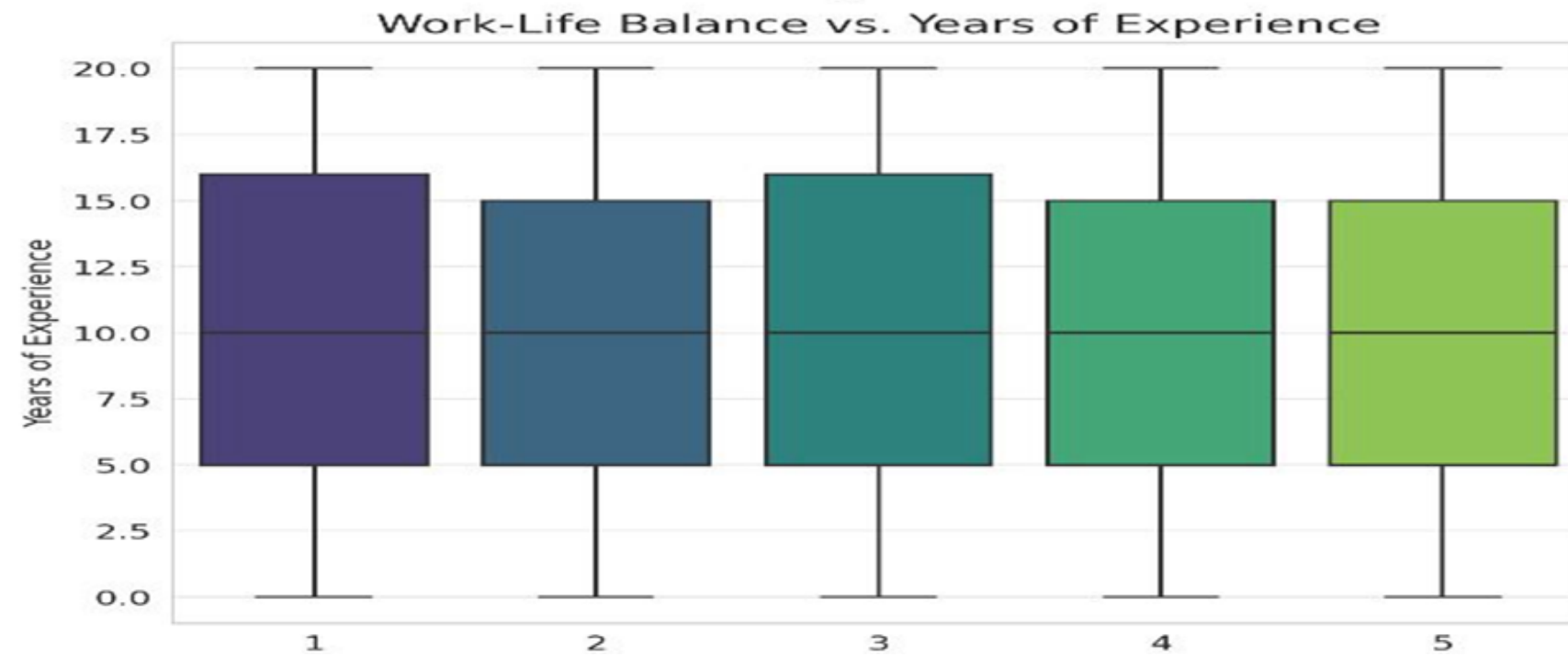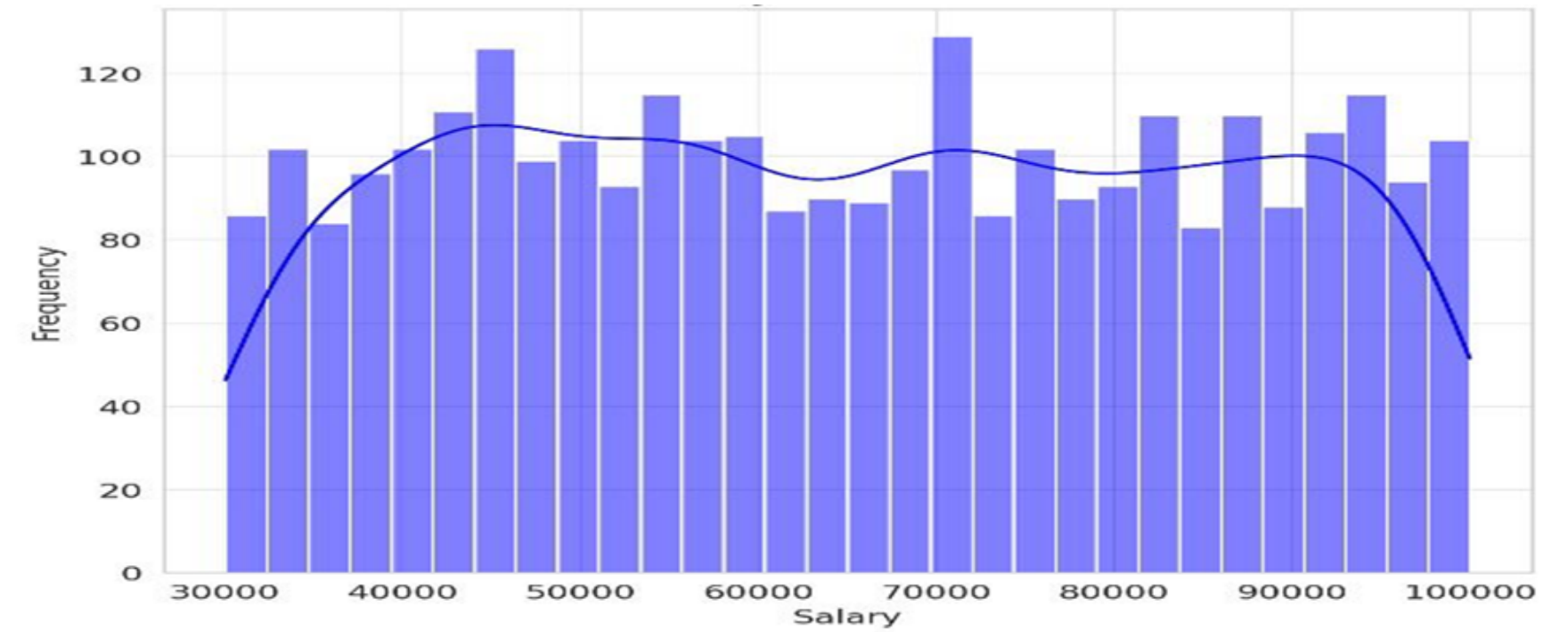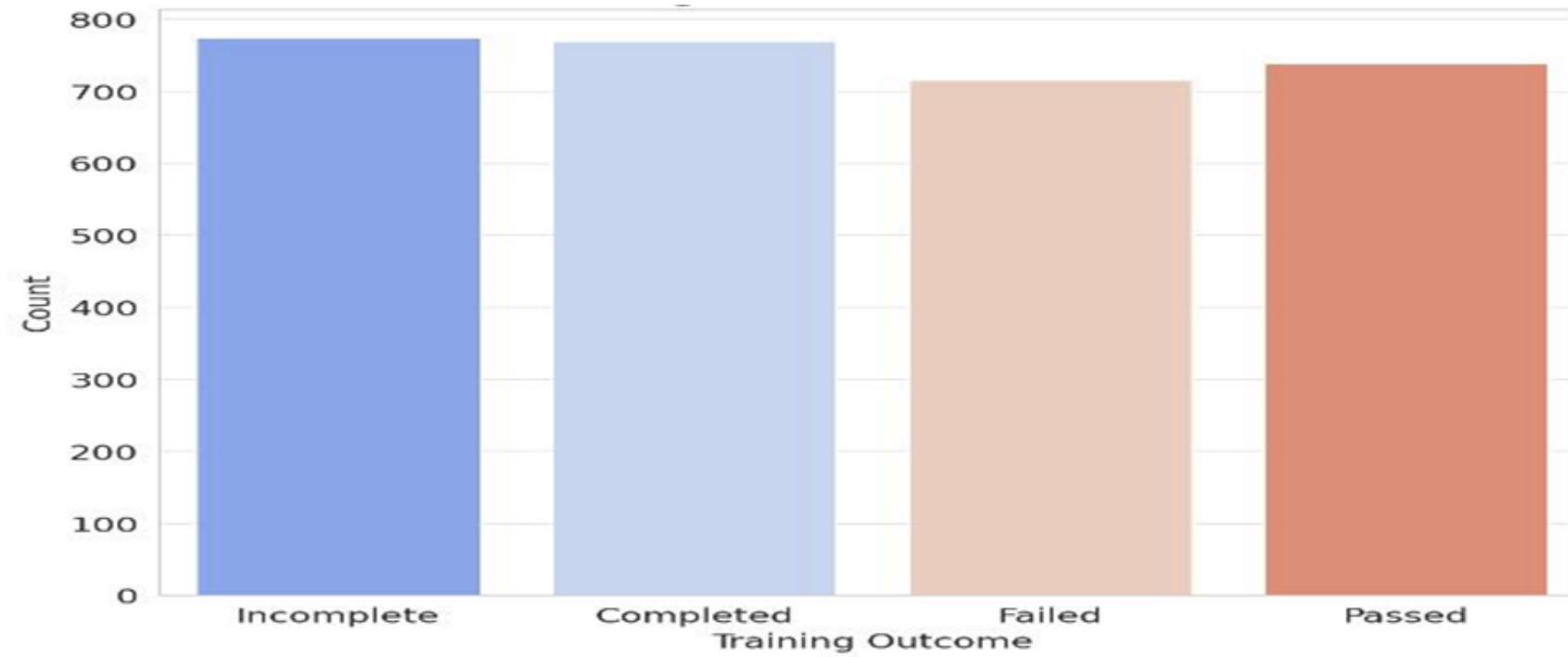No clear trend between work-life balance and years of experience

4 **Employee Rating Distribution**
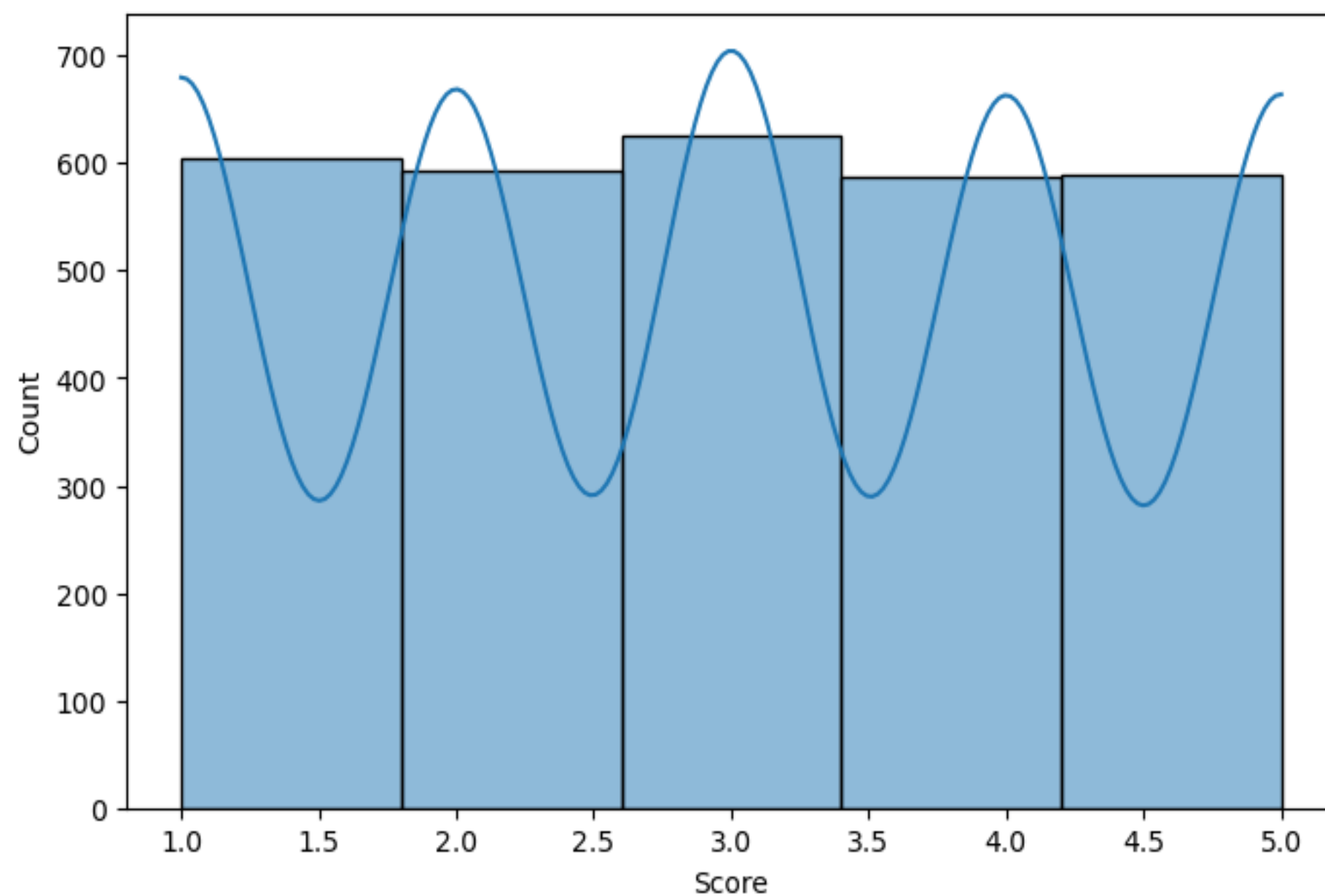Majority of employees have an average rating

Data analysis & visualization

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Data analysis & visualization

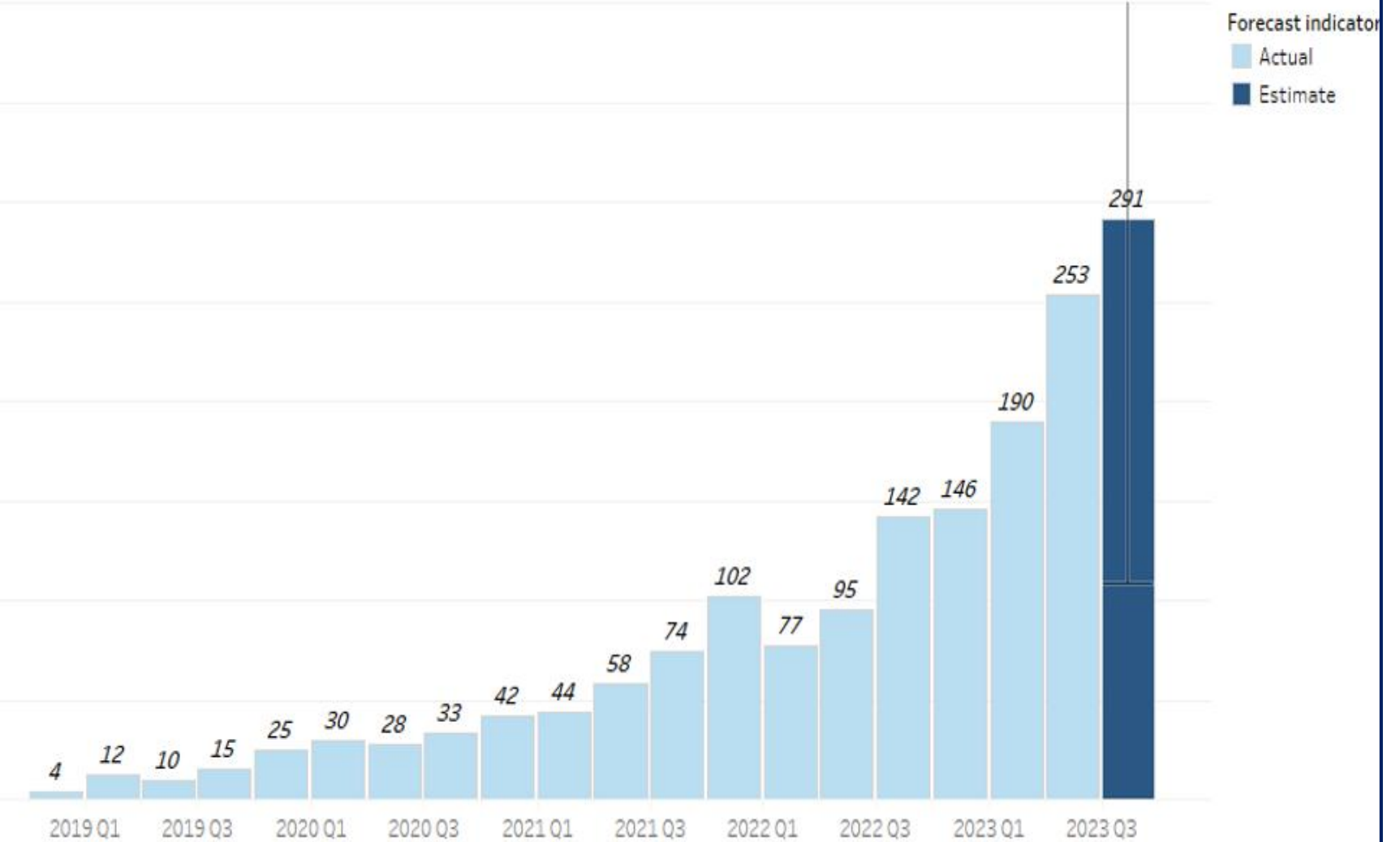Work-Life Balance Score Distribution
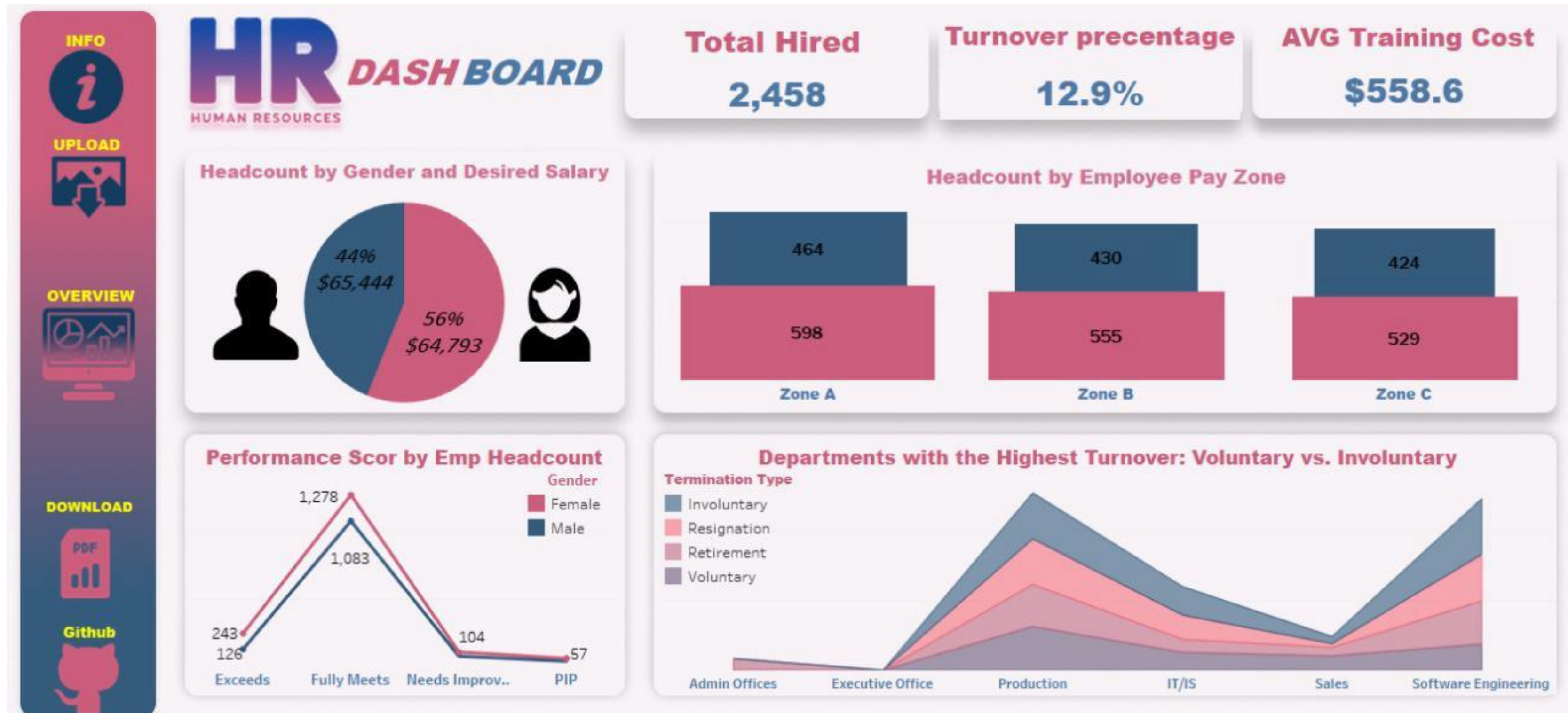

Employee Count per Department
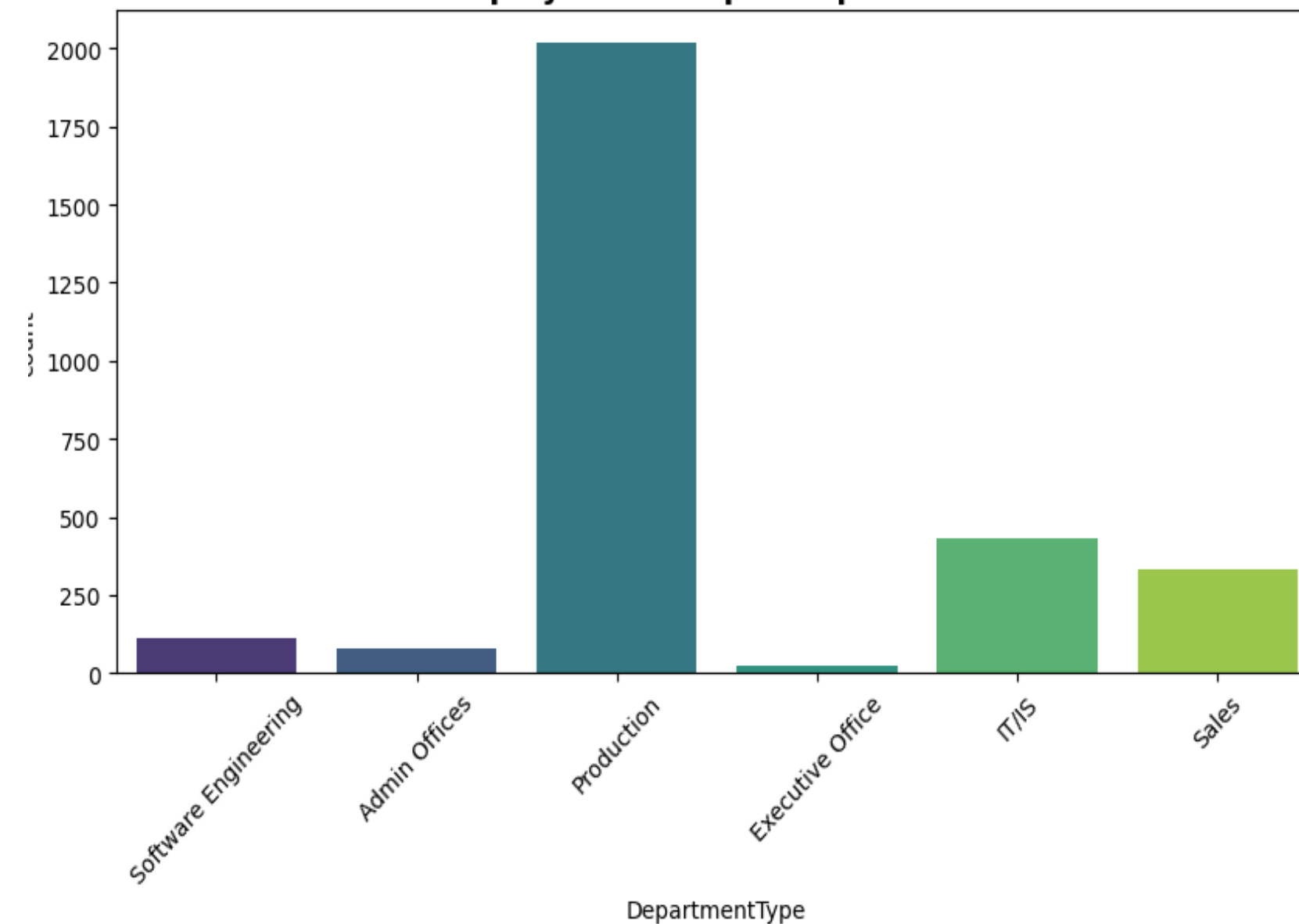
Forecasting Charts

Projected Training Cost for Next Year

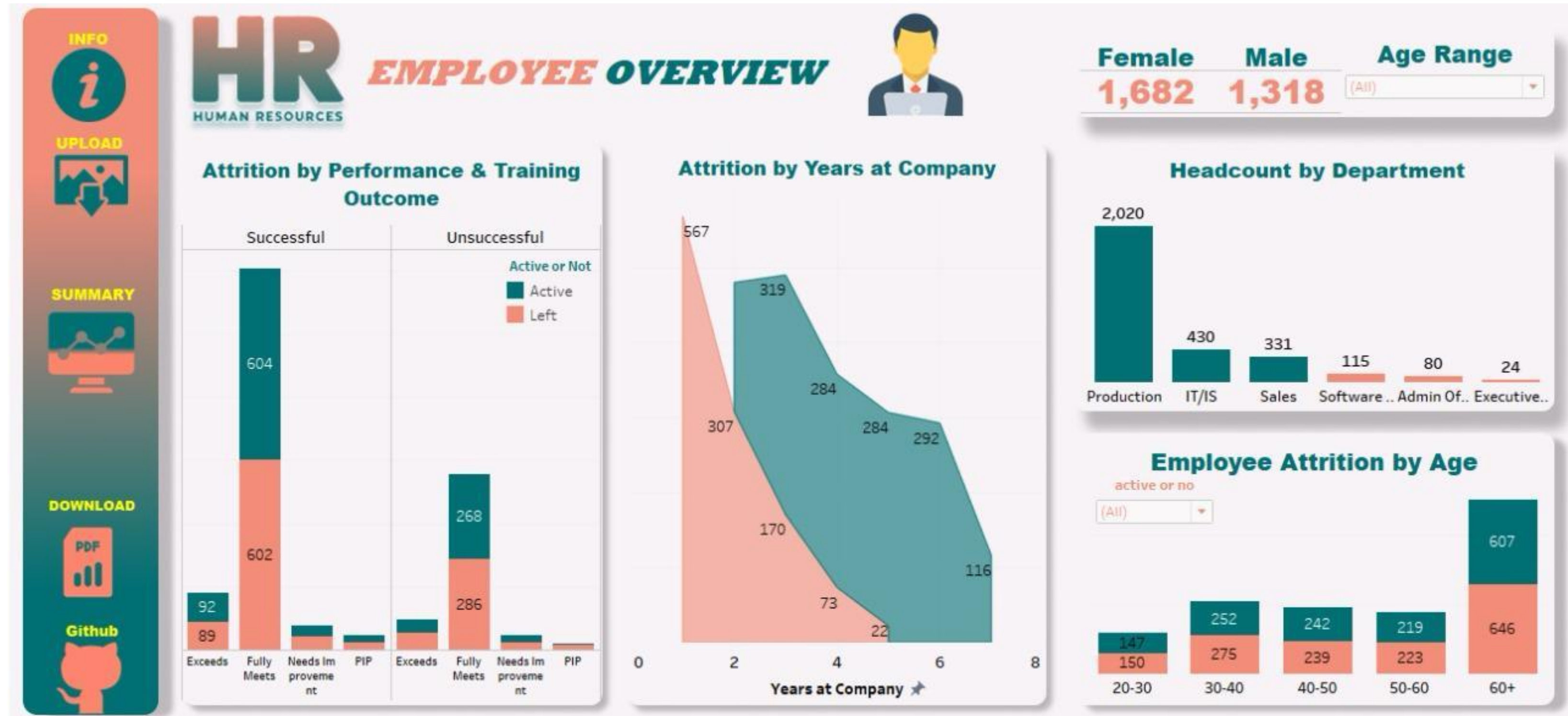prediction the number of employees expected to leave in the next quarter
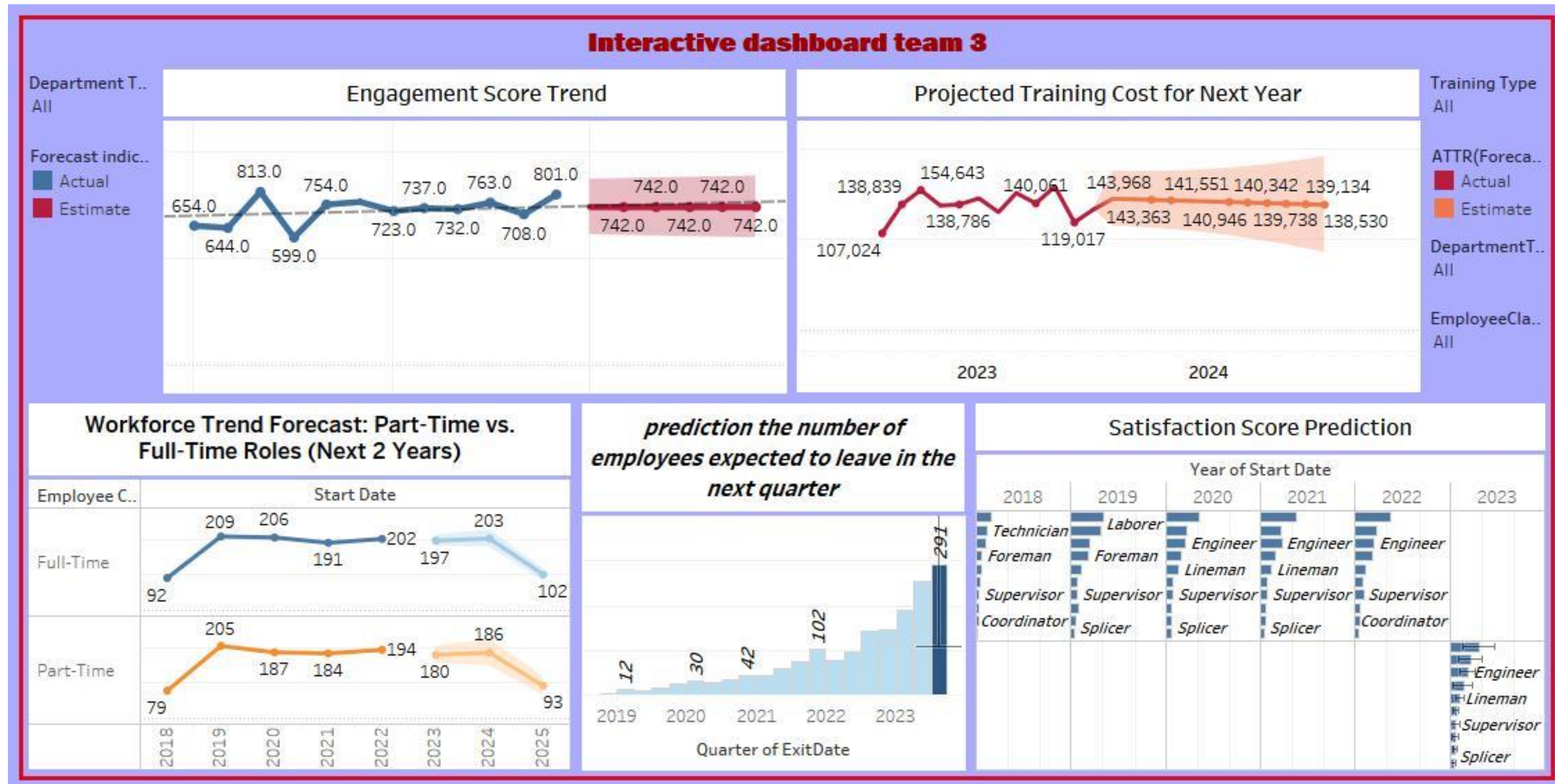
HR Insights Dashboard

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HR DASHBOARD
HUMAN RESOURCES

INFO
UPLOAD
OVERVIEW
DOWNLOAD
PDF
Github

Total Hired	Turnover precentage	AVG Training Cost
2,458	12.9%	$558.6

Headcount by Gender and Desired Salary

44% $65,444

56% $64,793

Headcount by Employee Pay Zone

Zone A	Zone B	Zone C
464	430	424
598	555	529

Performance Scor by Emp Headcount

Gender
- Female
- Male

1,278
1,083
243
126
104
57

Exceeds | Fully Meets | Needs Improv.. | PIP

Departments with the Highest Turnover: Voluntary vs. Involuntary

Termination Type
- Involuntary
- Resignation
- Retirement
- Voluntary

Admin Offices | Executive Office | Production | IT/IS | Sales | Software Engineering

Forecasting Dashboard

Key Company KPIs

Turnover precentage

12.9%

Total Hired

2,458

AVG Training Cost

$558.6

Turnover Rate

12.5% attrition moderate but needs monitoring.

Hiring Volume

2,458 employees hired strong recruitment activity.

Training Investment

$558.6 average cost shows commitment to development.

Employee Attrition Analysis

1

High Attrition in "Fully Meets" Category

Competent employees are leaving, indicating possible dissatisfaction or lack of growth opportunities

2

Successful Training Reduces Turnover

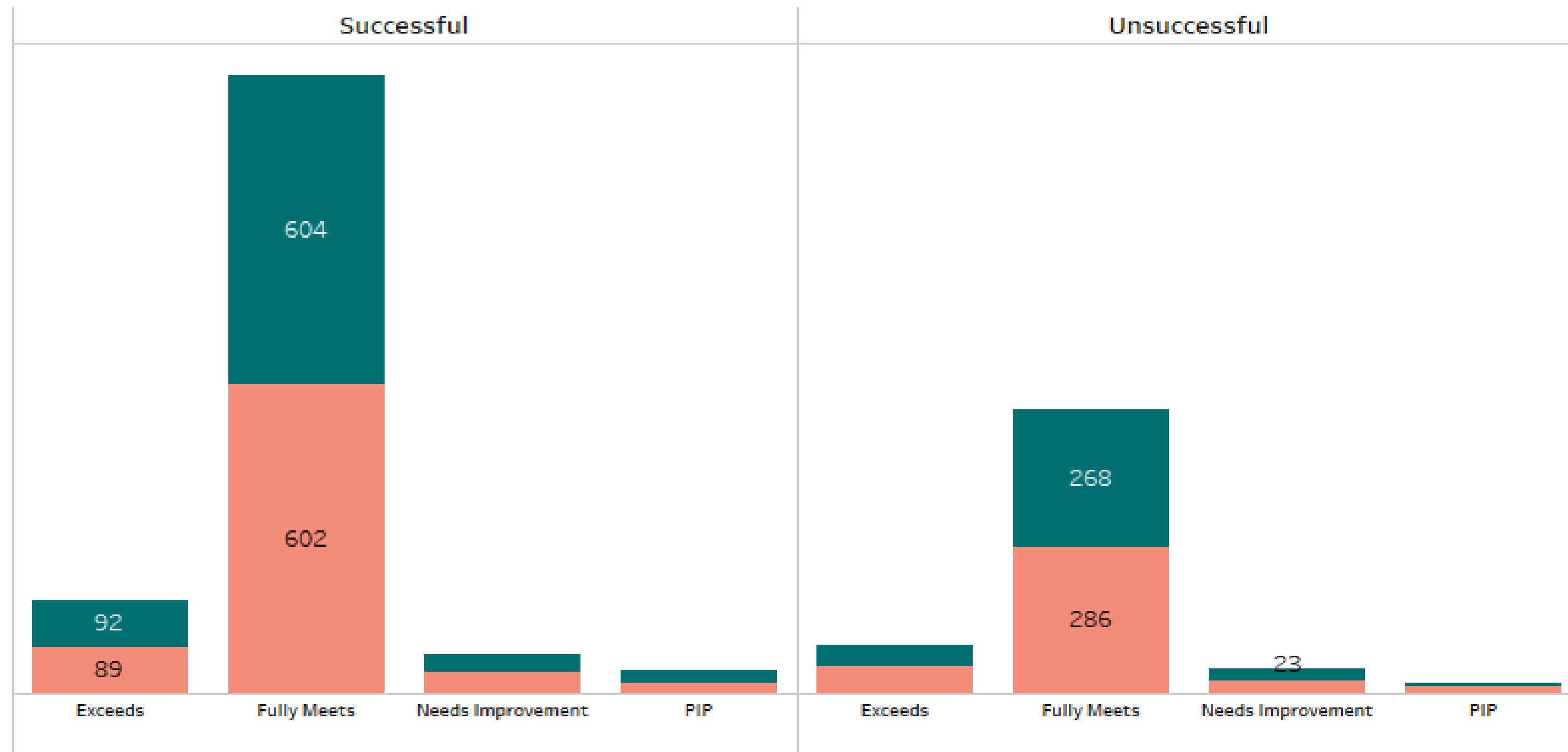Employees who complete training stay longer, proving its effectiveness

3

Top Performers Stay

Those in the "Exceeds" category have the lowest attrition, likely due to better career growth

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Employee Attrition Analysis

Attrition by Performance & Training Outcome

Turnover Rate by Department

Production Spike

significant increase in the production department The number of employees leaving rose from 811 in 2022 to 1,209 in 2023, a 49% increase.

Sales Exit Surge

·Turnover in the Sales Department Has Nearly Doubled Employee departures increased from 114 to 217, indicating high dissatisfaction or challenges in meeting target
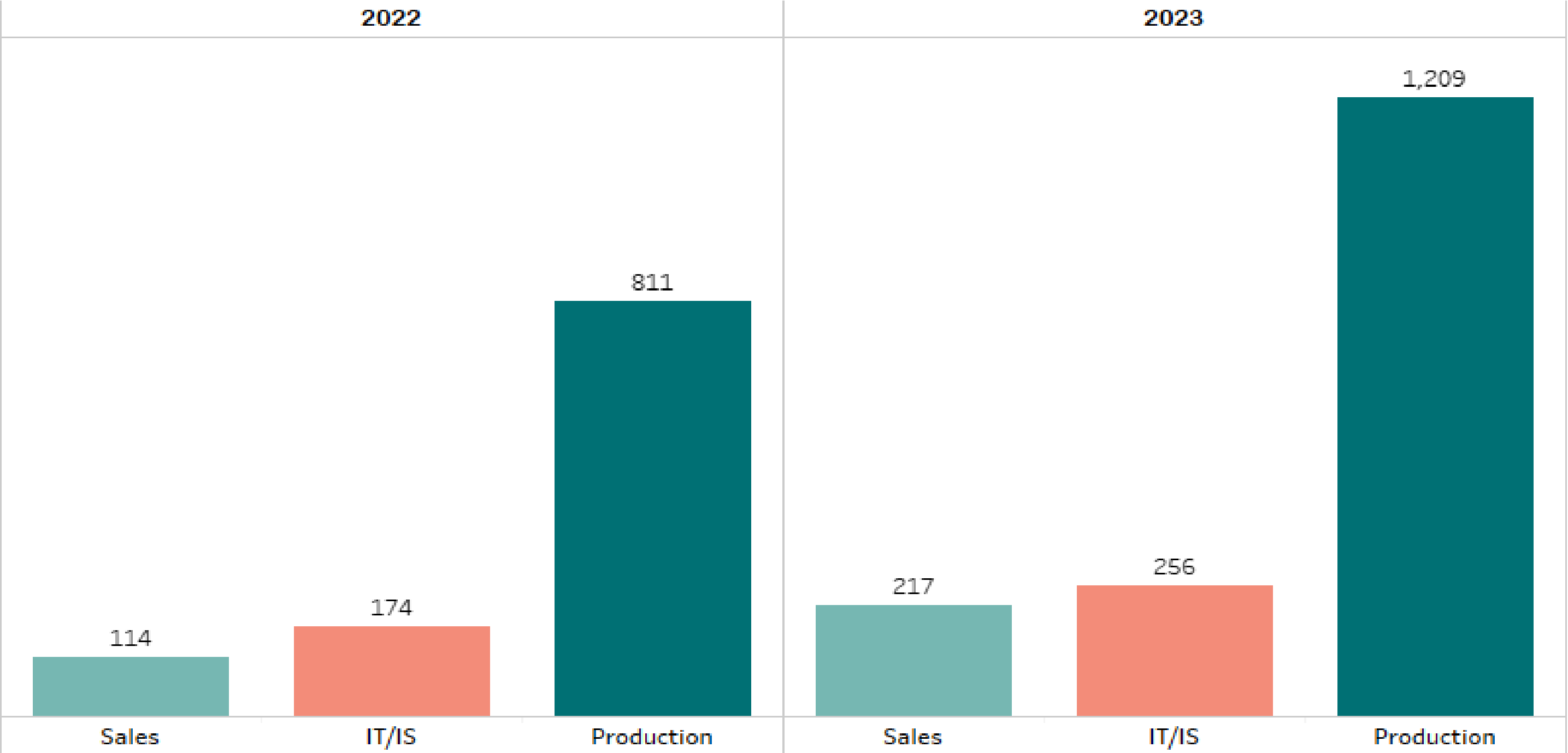
IT Turnover Rise

Moderate Increase in IT/IS Turnover The turnover increased from 174 to 256, a 47% rise

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Turnover Rate by Department

Top 3 Department by Turnover rate

Workforce by Pay Zone

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Headcount by Employee Pay Zone

Zone	Blue	Pink
Zone A	464	598
Zone B	430	555
Zone C	424	529

Zone A
- Highest number of employees
- More females than males

Action: Upskill & promote

Zone B
- Balanced gender distribution
- Action: Clear promotion paths

Zone C
- Fewest employees, senior roles
- Action: Retain & prepare successors

Attrition by Years at Company

- ➢ **Blue bars = Active employees**
- ➢ **Orange bars = Employees who left**

- ❑ High Early Attrition (0–1 year): ▪ 567 employees left in their first year. ▪ Indicates poor onboarding, unmet expectations, or lack of engagement early on.

- ❑ Stable Mid-Tenure Retention (2–6 years):
- ❑ Attrition stabilizes between 284–292 for those with 3–6 years of tenure.

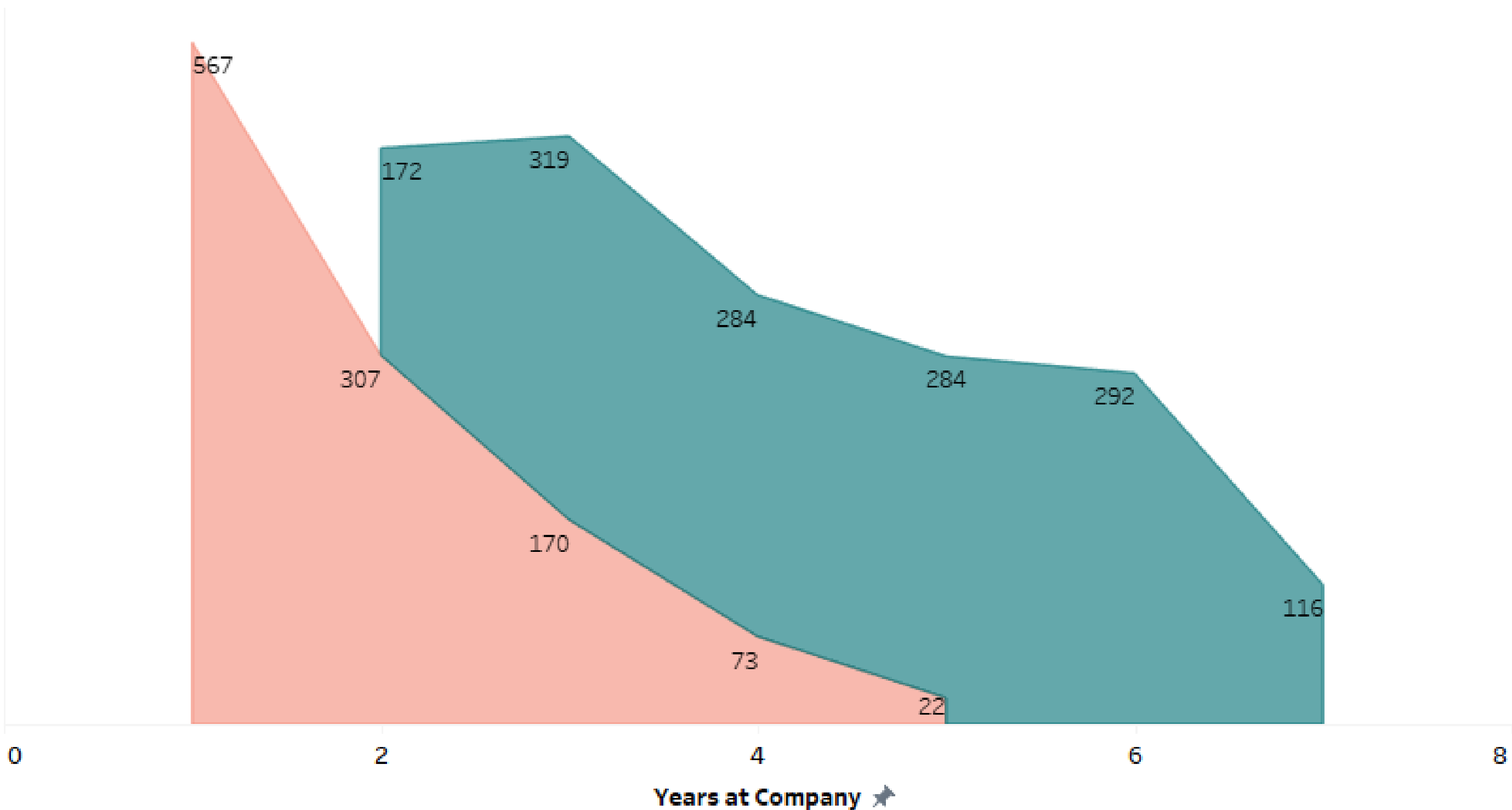- • Indicates moderate satisfaction but may also reflect limited advancement opportunities.

- ❑ Low Attrition After 6 Years:
- • Only 116 employees left after 7+ years.

Attrition by Years at Company

Gender-Based Performance Insights

Overall Performance Trend

Majority of employees fall under the "Fully Meets" category: 1,278 females vs. 1,083 males, indicating overall performance is meeting expectations

High Performers

More females in the "Exceeds" category:243 females vs. 126 males, suggesting higher performance levels among some female employees

Underperformance Indicators

Males slightly lead in the lower performance categories:
- "Needs Improvement": 104 males vs. 73 females
- "PIP": 57 males (females slightly lower but not clearly visible)

Gender-Based Performance Insights
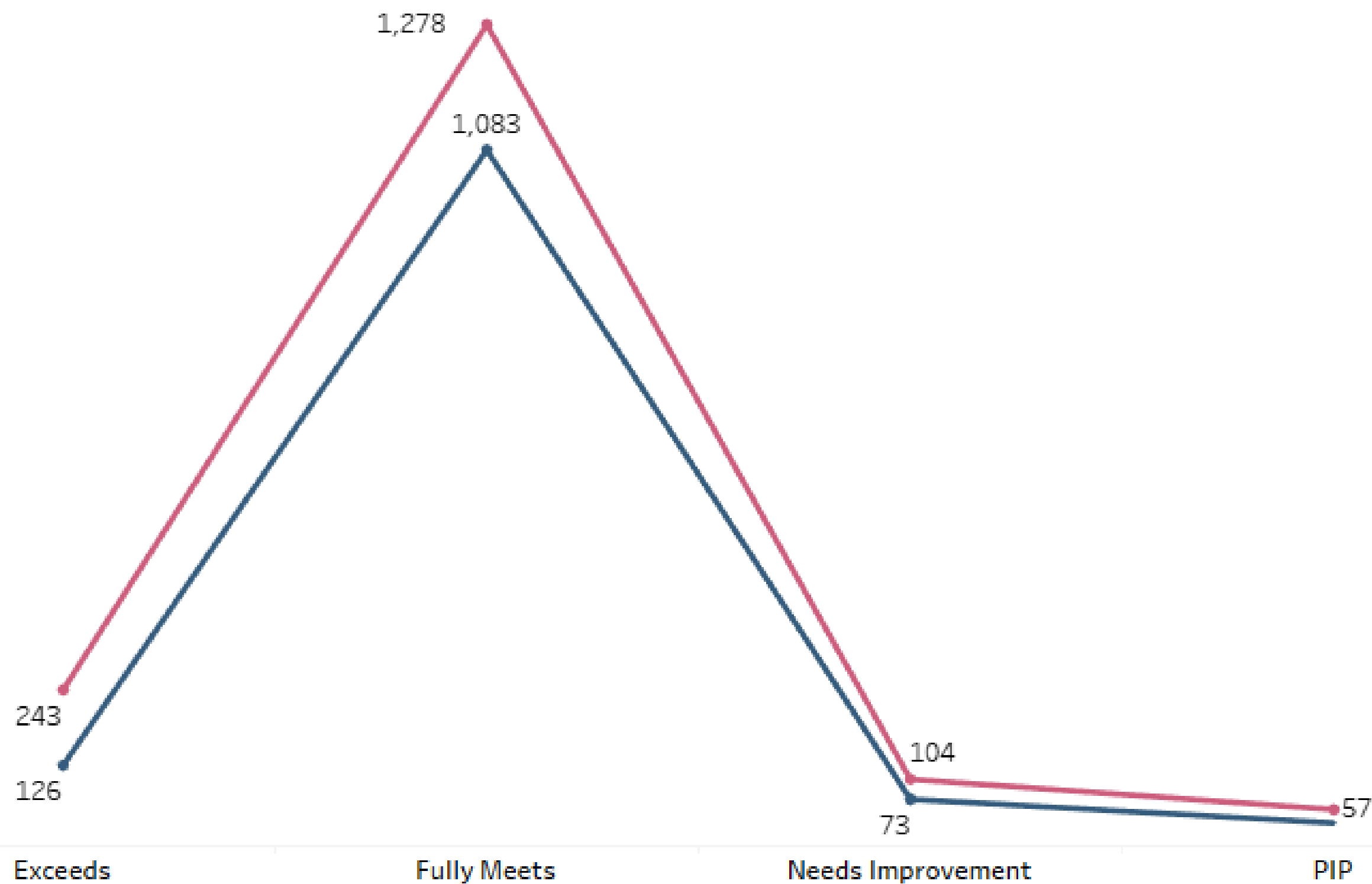
Big Thanks!
Explore the project further!

5th September, 2025
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