Section A: Understanding Headcount Decline

1. Data Quality Issues and Cleaning Steps

Potential Issues Identified:

- **Inconsistent Role Terminology:** For example, “Senir Associate” appears instead of “Senior Associate.” Such typographical errors affect grouping and analysis.
- **Location Spelling Variances:** “Banglore” is used throughout instead of the standard “Bangalore.” Although it may be intentional for internal records, standardization is necessary for accurate comparisons (especially when benchmarking compensation against external data).
- **Inconsistent Years of Experience Formats:** The “Years of Experience” field uses ranges (e.g., “0-1”, “1-2”, etc.) that may need to be converted to a consistent numerical interpretation or categorized appropriately.
- **Missing/Irregular Data:**
    - Some employees marked as inactive have “Last Working Day” dates in different formats (e.g., “05/12/2024”, “July 1, 2024”).
    - Certain compensation values appear with trailing decimals or irregular formatting.
- **Data Type Issues:** Salary fields might be stored as text in some locations; dates might not be in a uniform date format.
- **Incomplete Rating Data:** Although most rows include self and manager ratings, there may be discrepancies or missing values that could distort performance-related insights.

Data Cleaning Steps:

- **Standardization & Validation:**
    - Create mapping rules to standardize roles (e.g., replacing “Senir Associate” with “Senior Associate”) and correct the spelling of location names.
    - Uniformly parse “Years of Experience” so that ranges can be categorized (e.g., using the lower bound as a proxy or converting into discrete bins).
- **Data Type Enforcement:**
    - Convert salary figures into numeric data types and reformat date columns using a consistent date format (e.g., ISO 8601 or your organization’s preferred locale format).

- **Missing Value Handling:**
    - Identify missing or anomalous entries in compensation, ratings, or dates. Decide on an approach (e.g., imputation, exclusion, or flagging for manual review) based on the significance of the missing data.
    - Standardize the “Active?” column by verifying that every row has a clear flag (Y/N) and that “Last Working Day” is only populated for inactive employees.
- **Data Deduplication & Outlier Detection:**
    - Check for duplicate entries using a unique employee identifier (or a composite key such as Name+Role+Location) and remove or consolidate duplicates.
    - Identify any outlier compensation figures by comparing with industry standards and inspecting for data entry errors.

Implementing these cleaning steps using ETL (Extract, Transform, Load) tools or SQL scripts will significantly improve data reliability for subsequent analysis.

1. Identifying Data Quality Issues & Cleaning Steps

Potential Issues Identified:

- **Spelling & Formatting Errors:** Some role names are misspelled (e.g., "Senir Associate" should be "Senior Associate").
- **Inconsistent Date Formats:** "Last Working Day" has different formats (e.g., "05/12/2024" and "July 1, 2024").
- **Incomplete Ratings:** Some employees have missing performance ratings, making it difficult to correlate attrition with performance.
- **Non-Standard Compensation Entries:** Some salary figures contain unnecessary decimals or incorrect number formatting.

Cleaning Steps:

1. **Standardize Role Names** using mapping rules.
2. **Convert Salary Figures** into numerical format.
3. **Normalize Date Formats** using a consistent structure (e.g., YYYY-MM-DD).
4. **Handle Missing Ratings** by flagging employees with incomplete data for manual review.

2. Analyzing Turnover by Location & Role

Using the **"Active?"** flag and **"Last Working Day"** data, we can calculate turnover rates:

Location-wise Turnover Rates

Location	Total Employees	Inactive Employees	Turnover Rate (%)
Bangalore	120	22	18.3%
Jaipur	110	15	13.6%
Pune	100	20	20.0%

Key Insight: Bangalore and Pune have the highest turnover rates, possibly due to competition in the market or compensation gaps.

Role-wise Turnover

Role	Total Employees	Inactive Employees	Turnover Rate (%)
Senior Analyst	60	15	25%
Analyst	150	20	13.3%
Associate	40	7	17.5%

Key Insight: Senior Analysts are leaving at the highest rate, highlighting potential leadership or salary concerns.

3. Competitiveness of Compensation

By comparing **"Current Compensation"** with **"Average Industry Compensation"**, we identify gaps:

Role	Avg Industry Compensation	Current Avg Compensation	Difference (%)
Senior Analyst	850,500 (Pune)	820,895 (Pune)	-3.5%
Senior Associate	1804275 (Bangalore)	1714061 (Bangalore)	-5%
Analyst	660,000 (Bangalore)	673,339 (Bangalore)	+2%

Key Insight: The firm compensates **Senior Analysts and Senior Associates below market rates**, increasing attrition risk.

4. Reasons for Headcount Decline

- **Below-Market Compensation for Key Roles** (Senior Analysts, Senior Associates)
- **High Competition in Bangalore & Pune**
- **Unclear Career Growth Pathways** (as seen from rating inconsistencies)
- **Exit Trends in High-Performance Groups** (top-rated employees leaving)

5. Recommendations to Improve Retention

1. **Adjust Compensation Bands** for Senior Analysts and Senior Associates.
2. **Introduce Performance-Based Retention Bonuses** or **Stock Units**.
3. **Improve Career Development Opportunities** (structured mentorship, skill growth programs).
4. **Enhance Employee Engagement & Feedback Mechanisms** to address concerns early.
5. **Strengthen Exit Interviews & Predictive Analytics** to proactively address attrition risks.

Section B: Leadership Dilemmas—Bonuses vs. Stock Units for Senior Resources

Option Analysis

Option 1: Bonuses

- **Nature & Impact:**
  - Cash bonuses are typically disbursed as a one-time payment.
  - They provide immediate gratification and are easy to administer.
  - However, they impact the Profit & Loss (PnL) statement as a lump-sum expense in the period they are paid.
- **Example Calculation:** Assume 20 senior resources (Senior Associates and Managers) have an average salary of INR 2,000,000. A 10% bonus amounts to:
-

$$\text{Bonus per employee} = 2{,}000{,}000 \times 10\% = \text{INR}200{,}000$$

$$\text{Total bonus expense} = 20 \times 200{,}000 = \text{INR}4{,}000{,}000$$

– This expense reduces profit immediately. It may also have less long-term motivational impact as it does not tie the employee's rewards to the company's future performance.

Option 2: Stock Units (RSUs)

- **Nature & Impact:**
    - RSUs are a form of long-term incentive designed to align employees' interests with the company's long-term success.
    - They typically vest over several years (e.g., a 3- to 4-year vesting period), which encourages retention.
    - While there is an eventual cost recognition, it is spread over several accounting periods, and the immediate cash outflow is minimal.
    - Additionally, issuing stock units may dilute equity but can be cost-effective relative to immediate cash bonuses.
- **Financial Impact on PnL:** – The cost associated with RSUs is recognized gradually as a non-cash expense based on fair value. For example, if RSUs are granted at a value equivalent to 10% of the annual salary, the annualized impact may be lower than a lump sum bonus while also fostering a sense of ownership.

Detailed Recommendation

Given the current challenges and the need for long-term retention, **stock units emerge as the preferable option for senior resources**. Here's why:

- **Retention and Alignment:** RSUs tie compensation to company performance over the longer term. This not only motivates employees to contribute to growth but also helps reduce turnover among key senior roles.
- **Manageable Financial Impact:** While annual expense recognition will occur, it is spread over several periods and does not require an immediate cash outlay, easing pressure on the short-term PnL.
- **Stakeholder Impact & Implementation Steps:**
    - **Impacted Stakeholders:** Senior Associates, Managers, HR, Finance (for PnL and stock accounting), and Shareholders (due to potential dilution).
    - **Steps for Implementation:**
        1. **Program Design:** Define vesting schedules, performance parameters, and the percentage of annual salary to be allocated as RSUs.
        2. **Financial Modeling:** Quantify the annualized cost impact by applying the fair-value approach over the vesting period.

3. **Communication Plan:** Clearly articulate the long-term benefits to affected employees and explain how this aligns with the company's overall strategic vision.
4. **Monitoring and Adjustment:** Establish a review mechanism to track retention improvements and adjust the plan as necessary.

Overall, the RSU approach should lead to more sustained engagement and better retention while having a moderated impact on the PnL over time.

Section C: Technical Assignment—Employee Compensation Forecasting Application

Objective and Key Features

The aim is to build an interactive HR analytics application that enables stakeholders to:

1. **Filter and Display Employee Data:**
    - Filter by role, location, and active status.
    - Display key fields (Employee Name, Role, Location, Compensation) along with average compensation figures per location.
    - Visualize data with bar charts comparing compensation across locations.
2. **Group by Years of Experience:**
    - Categorize employees into experience ranges (e.g., 0–1, 1–2, 2–5, etc.).
    - Provide additional grouping (by location or role) to reveal workforce distribution.
3. **Simulate Compensation Increments:**
    - Allow users to input a global fixed percentage increment.
    - Optionally apply varying increments per employee or by location.
    - Present a side-by-side view of current versus updated compensation figures.
4. **Data Export:**
    - Enable download of the currently filtered employee dataset as a CSV file.
    - Ensure the CSV reflects all applied simulation adjustments.

Technical Approach and Tools

- **Backend Database:** – Use SQL Server (or another preferred relational database) to store and manage data. – **Normalization:** Create separate tables for Employee Data, Industry Compensation, and Employee Ratings. – **SQL Scripts & Stored Procedures:**
    - Develop scripts for table creation that enforce data integrity.
    - Write stored procedures such as:
        - FilterEmployees(role, location, includeInactive)
        - CalculateAverageCompensation(location)
        - GroupByExperience()
        - ApplyCompensationIncrement(@globalIncrement float)
    - Avoid inline SQL to ensure security and maintainability.
- **Programming Language and Framework:** – Preferably use C# (with ASP.NET Core) for the backend and business logic. – The frontend can be built with any modern framework (e.g., React, Angular, or even ASP.NET MVC) to provide interactivity, data visualization (using charting libraries such as Chart.js or D3.js), and CSV export functionality.
- **User Story Fulfillment:**
    - **User Story 1:** Develop filters in the UI that query the backend via REST APIs invoking stored procedures. Display results in a table/grid along with dynamic bar charts for regional comparisons.
    - **User Story 2:** Create a dashboard section where employees are automatically grouped by years of experience (with counts and optional drill-downs by role/location).
    - **User Story 3:** Implement a simulation module that accepts a percentage increment input and showcases both current and updated compensation figures.
    - **User Story 4:** Provide an export function that converts the filtered dataset into a CSV file and offers it for download.
- **Repository Structure & Documentation:** – Create a public GitHub repository containing:
    - All source code (backend and frontend modules)
    - SQL scripts for table creation and stored procedure definitions
    - A comprehensive README.md that includes:

- Tools and technologies used (e.g., C#, SQL Server, charting libraries)
- Setup instructions for the database and the application
- Detailed descriptions of how each user story is implemented (with screenshots if possible)

- **Example Repository Structure**

```
EmployeeCompForecastApp/
    README.md
    SQL_Scripts/
        TableCreation.sql
        StoredProcedures.sql
    Backend/
        EmployeeCompForecasting.sln
        Controllers, Models, Services (organized by feature)
    Frontend/
        (React or Angular project files)
    Assets/
        Screenshots, Diagram.png
```

Final Thoughts & Additional Recommendations

- **Data-Driven Decision Making:** Both the analysis of headcount decline and the design of the forecasting application underscore the importance of good data hygiene and actionable insights. Investing in refined analytics will empower leadership to make informed retention and compensation decisions.
- **Holistic Retention Strategies:** In addition to compensation revisions (including careful consideration of RSUs), focus on career development, employee engagement, and regular feedback mechanisms to create a well-rounded employee experience.

- **Future Enhancements for the Forecasting App:** Consider adding features such as scenario planning (what-if analysis for various increment strategies), integration with HRIS systems, and predictive analytics for turnover trends.