19348992_AISO7001

by Hritik Gupta

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OXFORD BROOKES UNIVERSITY

ConnectLab Business Analysis Report

AISO7001: Business Intelligence

Student ID - 19348992

Executive Summary

Conceived to address the challenge of workforce attrition in 2014 to 2024, the ConnectLab Employee Attrition Insights Dashboard is an insightful and visual analysis of the attrition of the workforce. At the top, key performance indicators (KPIs) provide the organization's workforce size (1,279 employees), attrition rate (18.53%), attrition count (237) and average age (30). The visualizations used on the dashboard include a variety of them to find the drivers for attrition: Technology and Sales departments have highest attrition (a donut chart), bubbles with bubbles packed show a strong link between overtime and employee departures and bar charts show lower and mid-range salary bands and younger age groups (21–27) are at more risk.

Higher attrition for employees with educational background in Marketing and Technical is discovered by a line graph. The dashboard is color coded, labeled clearly and laid out in an intuitive manner so even executives, HR and department managers can easily find what they need to know. With these insights, ConnectLab is able to pinpoint important risk factors we reveal and leverage our retention strategies to focus on reviewing overtime policies, making compensation adjustments and developing early career development. Utilizing this dashboard, ConnectLab can proactively mitigate attrition, enhance employee satisfaction, and provide support for business growth, leading to ConnectLab's competitive advantage in the technology industry.

Contents

1. Introduction

1.1 Company Overview

ConnectLab acts as the leading provider of software solution that assists the energy sector, engineering industry and transportation sector to adopt Artificial intelligence capabilities. Since the establishment of the university spin out business, now operating from London Reading, Oxford while holding almost 1500 employees, ConnectLab has grown. The company offers three main services, that consists of their cutting-edge engineering solutions along with their training programs and their self-developed machine learning platform. As a result, ConnectLab is devoted to assisting companies to increase capability in artificial intelligence solutions that proceed aligned to its operational efficiency as well as innovation imperative.

1.2 Problem Delimitation and Business Context

Despite its technological strengths and rapid growth, ConnectLab faces a persistent challenge: high employee attrition. Since 2014, the company has experienced significant turnover, particularly in its core departments. This attrition disrupts business operations, incurs substantial recruitment and training costs, and threatens its capacity to deliver value to its clients.

The competitive landscape of the technology sector, combined with shifting employee expectations around compensation, work-life balance, and career development, has heightened the urgency of addressing this issue. As highlighted by the Society for Human Resource Management (SHRM, 2023), technology firms face industry-average attrition rates of 13-15%. ConnectLab's rate, at 18.56%, is notably higher, indicating a need for focused intervention.

1.3 Justification and Impact

Why focus on attrition?

Just as many other organizational metrics, employee attrition does not stop at the doorstep to human resources. It is a strategic concern that affects organization

performance whole. A high level of turnover is not only a loss of employees, but also the dissipation of an organization's institutional knowledge and experience (Cascio, 2016); increases recruitment and onboarding expenses (Bersin, 2019).

This evidence is echoed in the wider literature and in ConnectLab's own internal HR data. By intelligent analysis of the company's workforce data, it showed that attrition rate is as high as 18.56% and Technology and Sales departments were the most hit. Around the same time, academic studies further confirm that compensation, overtime, and absence of career progression are some of the major reasons that lead to turnover in the knowledge-based sectors (Hom et al., 2017; Harvard Business Review, 2023). According to the 2024 Gartner industry blueprint, targeted retention strategies focusing on early career employees and roles worth high demand are also imperative.

This is a data driven analysis of attrition at ConnectLab using advanced analytics and visualizations to get to Absolute Root Cause of the drivers of attrition. These insights aim to provide direction for strategic interventions, bolster effective retention of employees, and boost the effectiveness of the organization.

2. Dataset Overview

2.1 Data Structure and Variables

ConnectLab provided a relational dataset composed of three tables:

1. **Employee (employee.csv):**

   The Employee Attrition Insights Dashboard dataset used has demographic, employment, and attrition data about ConnectLab employees from 2014 to 2024. There are key fields to identify a unique employee: gender, age, department, education and education field, job role, salary, overtime status, hire date, and attrition status; further variables are business travel frequency,

distance from home, ethnicity, marital status, stock option level, and years in different roles or under current managers.

2. **Performance Rating (performance_rating.csv):**

   The employee data is complemented by the Performance Rating dataset with information about employee performance and workplace satisfaction. Fields such as Performance ID (unique identifier), Employee ID (as a reference field to link records), Review Date should be used as key fields. In addition to these satisfaction metrics, the dataset also captures important metrics like Environment Satisfaction, Job Satisfaction, Relationship Satisfaction, and Work Life Balance. Besides, it includes both the self-rating rank and the manager rating rank, and the number of training opportunities within the year and the training taken by every employee within the year.

3. **Education Level (education_level.csv)**

   The Education Level dataset contains Education Level ID and the associated Education Level like Bachelor, Master, or PhD. Analysing attrition and other workforce trends, this dataset is connected directly with employee records by education level.

2.2 Data Preprocessing and Cleaning

During the preparation of the ConnectLab employee dataset, Excel was the main tool for loading, cleaning and enriching data, as it provided flexibility and great performance when dealing with tabular complex data. The data was first cleaned thoroughly, removing duplicate records and ensuring that the fields that were categorical, such as Employee ID and Performance ID, were consistent. When missing values were present, they were taken care of either through exclusion or imputation based on the severity of the issue to the analysis, and key fields such as

Employee ID, Education Level ID and Performance ID were cross checked for consistency.

Data enrichment steps were then performed, subsequently to the cleaning step, in order to gain analytical depth. Also, they created new columns that would categorise the employees into groups by age (for example, 18-20, 21-27 up to 60) and segment salary into slabs (which are also fairly meaningful from the attrition perspective). We encoded categorical variables, e.g., overtime status, so that they can be visualized correctly and effectively in Tableau. Furthermore, attrition counts were aggregated by appropriate categories for targeted analysis.

The third and final stage of the process was to join the three datasets (Employee, Performance Rating, and Education Level) on their respective keys in order to integrate them together. This integration added details to each employee profile and maintained relational integrity between the tables; providing a good foundation for the analysis and visualization done in Tableau. The systematic nature of data cleaning, enrichment, and integration in Excel was critical for generating trusted insight that also bolstered the high-quality visualizations of the Employee Attrition Insights Dashboard that were generated.

2.3 Descriptive Statistical Analysis

First did some preliminary analysis of the statistical structure and main distributions of the dataset in order to get a better sense of how the dataset is in general and together. In the dataset, employees' age varies from 18 to 51 years, with a mean age of 30, which helps to identify the total demographic profile of the workforce. Gender distribution is balanced; this helps to make the risk of having bias when imaging patterns from the data and drawing conclusions lower. Three departments make up

the major parts of the company's organizational structure. Technology, Sales, and Human Resources. Through salary data, one is able to understand a typical corporate hierarchy from entry level to senior level, with meaningful banding that allows for true comparative analysis. Overtime is modelled as a binary, with the striking result that a remarkable fraction of employees must work overtime. Perhaps most importantly, attrition data demonstrates that during the observed time period, 237 employees (18.56 % of the workforce) have left the company. But these initial descriptive statistics are the foundations on which we base more detailed analysis and visualization, giving necessary context into the factors that drive employee attrition at ConnectLab.

3. Methodology

3.1 Analytical Tools

In the early stage of the analysis, Excel was used for cleaning, transformation (e.g. categorization), feature engineering and calculation of summary statistics. Pivot tables and formula functions in Excel were used to make efficient preparation and structuring of the dataset for analysis later. Interactive visualizations and dashboards were then created using Tableau Desktop by capitalizing on the tool's intuitive drag-and-drop functionality to find and explore relationships in the data and create clear, compelling visualizations for KPI tracking and stakeholder presentation purposes. Descriptive statistics, visual exploration and correlation analysis methods were used to diagnose underlying patterns and identify potential outliers. During the visualization process best principles were followed by using an appropriate colour palette, with well labelled figures and design layout that facilitated readability and stakeholder engagement (Few, 2012).

3.2 Step-by-Step Analytical Process

First, the acquisition and review of three key datasets to complete the first stage of the data journey for the Employee Attrition Insights Dashboard. Using three variables: Employee, Performance Rating, and Education Level. Data quality and completeness assessments were made in each dataset to guarantee a quality base for analysis. The Excel was used for a first data cleaning where we removed the duplicate records and standardized the field value. Appropriate exclusion or imputation was used to address missing data and the three data tables merged by their unique identifiers, creating a unified dataset enriched with employee profiles. Aside from this, feature engineering in Excel added more juice to the data by binning ages into meaningful groups for visualization, creating salary slabs to enable easier comparison and encoding categorical variables to make them compatible with Tableau. We also aggregated attrition counts by any relevant categories in order to support targeted analysis.

For initial distribution analysis, it starts with Excel, and moved to Tableau to go deeper with visual exploration. Using this process, outliers and patterns in attrition were detected by department, overtime status, salary, education field, and age group. Development of Tableau visualization was an iterative process of clarity and business relevance. Donut charts were chosen for comparing proportions of categorical data (Knaflic, 2015) while packed bubbles were chosen for categorical volume, bar graphs were chosen for discrete comparisons, and line graphs were chosen for trend analysis.

4. Exploratory Data Analysis and Dashboard Visualizations

The dashboard (see Appendix) is structured to provide both clear and detailed insights:

4.1 KPI Overview

Employee Count	Attrition Rate	Attrition Count	Avg. Age	Average Salary
1,277	18.56%	237	30	65,154

Fig 1- Key Performance Indicator (KPI)

Several key performance indicators (KPIs) are displayed prominently on the dashboard to give an immediate view of ConnectLab's workforce and attrition landscape. With 1,277 employees on board, it is easy to see how big the organization is currently. The attrition rate comes out to be 18.56%, implying what is the proportion of total employees that have left the company during the noticed period. In absolute terms, it yields an attrition count equal to 237 individuals. In addition, the average age of employees is 30 years old, placing the workforce within a relatively young demographic. These sets of KPIs work together as a synopsis of the company's human resources, so management will be able to quickly tell the extent and urgency of the attrition issue. The following high-level summary provides the setting for deeper analysis and facilitates well informed decision making around workforce planning and retention strategies.

4.2 Attrition by Department – Donut Chart

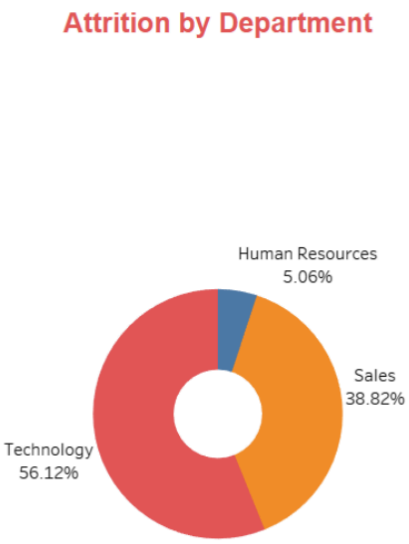

Fig 2- Attrition by Department (Donut Chart)

For ConnectLab, the relative, or proportional, contribution of each department to overall employee attrition was visualized with a donut chart. From the visualization, we see that Technology contributes to 56.12% of all the attrition, Sales 38.82% and Human Resources 5.06%. In terms of distribution, there is a disproportionate number of departing employees from the Technology department. The pattern may indicate workforce management issues, leadership problems, or their perception of greater competition for technical talent in the external market. Results indicate that retention efforts need to be targeted within the Technology and Sales departments. Within these areas, strategic initiatives that include enhanced career development opportunities, structured mentorship programs and an improved workload balancing

would help address the root causes of attrition and contribute to the stability of the organization.

4.3 Attrition by Overtime Status – Packed Bubbles

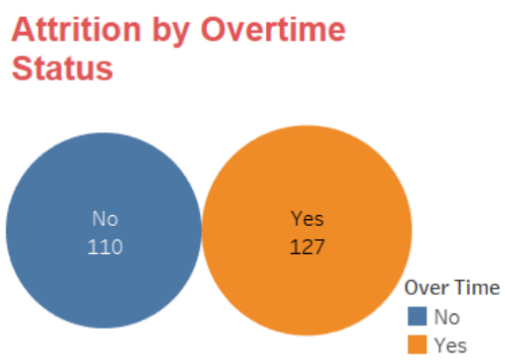

Fig 3- Attrition by Overtime Status (Packed Bubbles)

In the “Attrition by Overtime Status”, used a packed bubbles chart to show the volume of attrition for employees by overtime work. We can very clearly see that employees who work overtime are much more likely to leave the organization (both ‘Yes’ and ‘No’ are much larger than for non-overtime employees). This large difference indicates clear relationship between overtime and attrition, which points out that heavy workload and employee burnout are important causes of employee turnover. Viewed through a business lens, these results point to a need to revisit and possibly change overtime policies, ask for work-life balance, and monitor employee well-being. By focusing on these areas, ConnectLab can work to head off attrition due to burnout, promote a healthier work environment, and enhance employee retention overall.

4.4 Attrition by Salary Range – Bar Graph

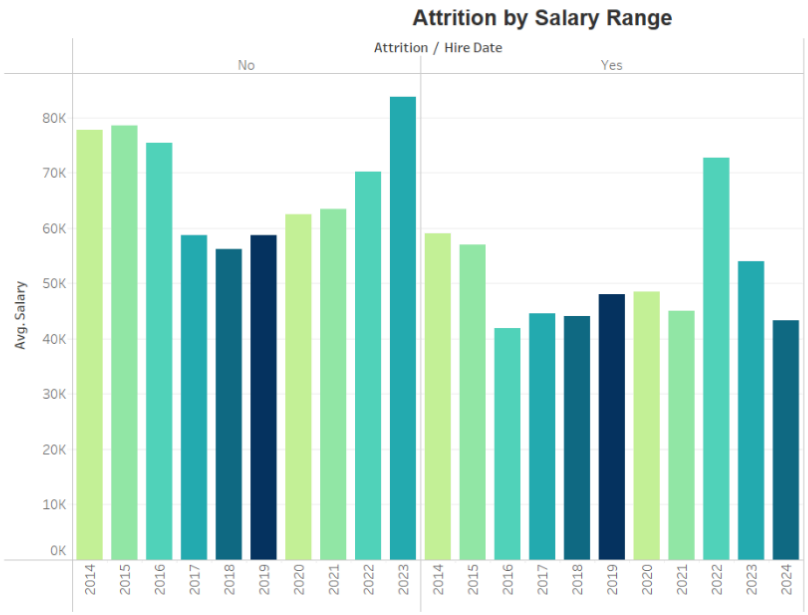

Fig 4 – Attrition by Salary Range (Bar Graph)

Visually, the bar chart displaying attrition by salary range brings to light the correlation between employee turnover and compensation at different salary levels, with the years of hire further broken out. Its visualization shows that employees in lower and mid-level salary bands suffer the highest levels of attrition. This implies that while turnover is high, it is especially pronounced amongst those who may feel underappreciated — by hard work, pay, or both. Moreover, variations of attrition patterns by year of hire can be attributed to the market conditions and changes of the company's compensation policies. Both from business perspective, these findings demonstrate that it is essential for companies to periodically review their compensation structure to maintain pay equity and a competitive pay program. ConnectLab needs to determine and, where possible, readjust relevant salary bands

which are most at risk of suffering dissatisfaction and so risking further attrition of key groups of employees.

4.5 Attrition by Education Field – Line Graph

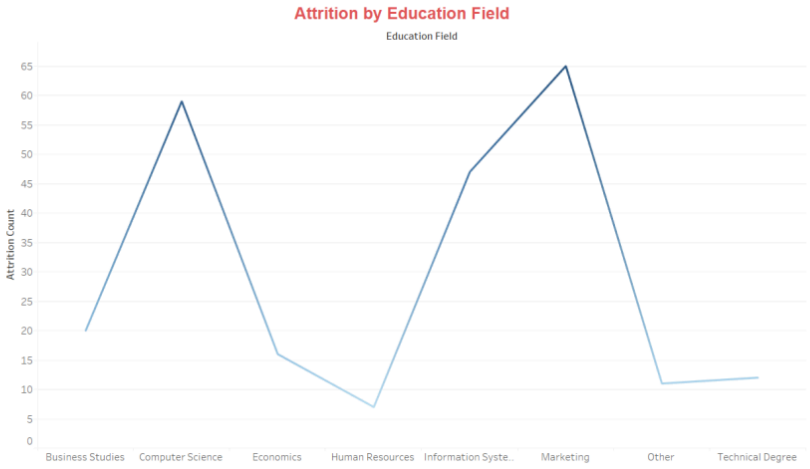

Fig 5- Attrition by Education Field (Line Graph)

In the line graph of attrition by education field, we can clearly see how employee departures are segregated by academic background in fields of Business, Computer Science, Marketing, and technical fields. According to the data, employees in technological and marketing fields face considerably higher attrition rates than other fields. There can be a number of factors that impact this pattern, for instance, difference in external job opportunities, lack/alignment of employees' educational training with their current job role, or discrepancy in employees' job satisfaction indicators. These findings demonstrate how the educational background of employees should be considered in alignment with the design of employee retention and development programs. Reduction of turnover will require designing career paths that are clearly defined, attractive and conducive to the aspirations of employees in high-risk education fields. Specific initiatives tailored towards these

groups and their specific needs and expectations are a key for ConnectLab retaining vital talent and retaining itself in the market.

4.6 Attrition by Age Group – Bar Graph

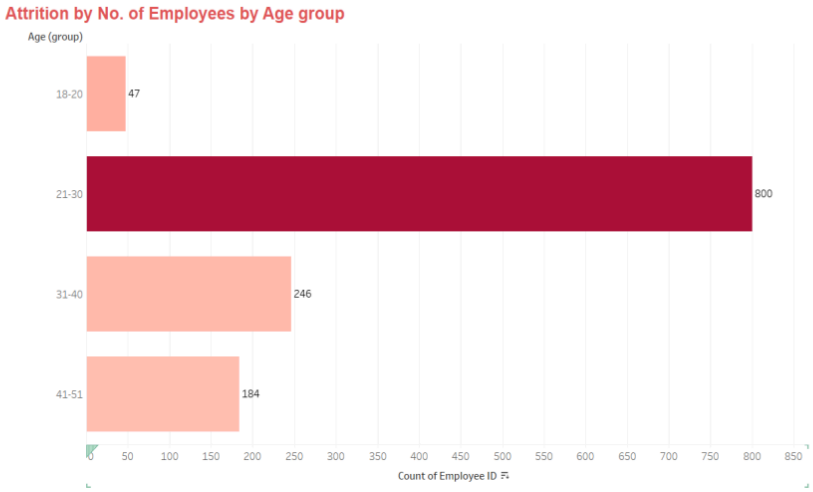

Fig 6 – Attrition by No. of Employees by Age group (Bar Graph)

A bar graph showing attrition based on number of employees across age groups shows how employee departures are spread across age in ConnectLab. Attrition is highest among those employees in the 21 to 27 age band, followed closely by those aged 24 and 27, and is markedly lower throughout younger and older cohorts. This trend leads to the conclusion that early career employees seem most likely to leave the organisation for factors such as increased mobility, a desire for rapid advancement or unmet expectations in roles. Looking at this, it is evident that ConnectLab would benefit tremendously from initiatives such as partnering with organizations that would in turn have mentorship programs, skill development opportunities, and clear career growth pathways for early career professionals. By helping to develop and engage employees in this crucial age group, the company

can decrease attrition, bolster emerging talent, and construct a more stable and more experienced workforce to come.

5. Findings and Discussion

5.1 Key Insights

By analysing ConnectLab's employee attrition data, several critical patterns emerge that hold multiple implications for how the organization should approach its workforce strategy. There have been disparities in attraction between departments, with Technology and Sales being clear hotspots. These areas also have a high turnover that presents a direct threat to project continuity as well as to the maintenance of strong client relationships. Work overtime is emerging as a key risk factor, as employees who are expected to work longer hours are substantially more likely to leave, demonstrating the critical importance of work life balance to retention. This role is decisive also for compensation; The employees in the lowest and middle ranges of salary bands have the highest rates of attrition, indicating that dissatisfaction with pay is a major rationale for desertion. Additionally, there is a sensitivity to education field- personnel from the marketing and technical fields tend to experience higher attrition rates; an indication of greater external demand for their skills or a misfit of their skills to the role played. Thirdly, the data indicates that the company is experiencing a youth exodus as workers aged 21 – 27 are most likely to leave the company. This indicates a trend that younger staff may not be feeling 'engaged enough' or looking for more development opportunities than they are getting out of ConnectLab. Taken together, these insights form the rationale for the development of a targeted retention strategy, including personalized career development interventions, competitive compensation changes, and increased support for early career professionals.

5.2 Supporting Evidence

According to the SHRM (2023), attrition rates in technology firms generally exceed the average industry standard of 13-15% specified by the Society for Human Resource Management. By contrast, ConnectLab's own attrition rate is even higher than this benchmark, and this has been borne out in more recent Gartner (2024) research. Various academic research articles continue to link high turnover in knowledge-based industries to overtime and lack of proper compensation which studies by Hom et al., (2017), Hancock et al., (2013) affirm to have serious effect on employee retention.Together, these findings stress the necessity of targeted retention tactics that have both organizational and individual needs and support the need and importance of ConnectLab's data driven approach to helping organizations manage employee turnover.

5.3 Discussion

The results of the analysis in turn, confirm that attrition at ConnectLab is caused by a combination of organisational, demographical, and employment factors. Attrition appears to be dense in Technology and Sales, with department specific problems but also appears to be related to overtime and lower salary bands suggesting systemic problems. Attrition of the younger employees and from particular education backgrounds identifies the need for the tailored engagement and development strategy.

Dashboard

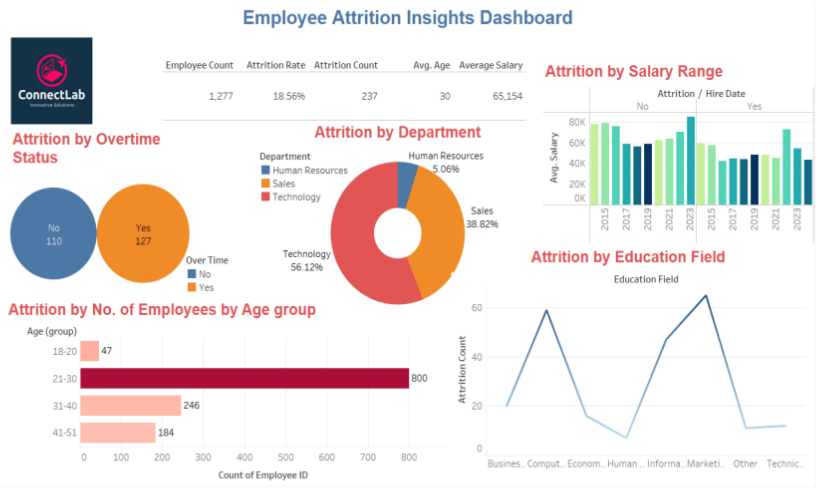

Fig 7 – Employee Attrition Insights Dashboard

The Employee Attrition Insights Dashboard aims to help ConnectLab mitigate attrition and drive business growth. KPIs offer an immediate view of employee numbers, attrition rates, and average age. Visualizations like donut charts highlight departmental attrition, packed bubbles emphasize the impact of overtime, while bar and line graphs break down attrition by salary, age, and education. This data aids in identifying key risk factors and informs targeted retention strategies. By addressing these trends, ConnectLab can foster employee satisfaction, reduce turnover, and strengthen its competitive edge.

6. Strategic Recommendations for Business Intelligence Implementation

To address attrition and support data-driven decision-making, ConnectLab should implement the following business intelligence (BI) Tactics:

Recommendation 1: Use a Centralized Business Intelligence Platform

ConnectLab should invest in developing a centralized business intelligence (BI) platform, for example with the use of Tableau Server or Microsoft Excel connected to HR, performance and compensation systems. When this disparate data source is consolidated, the organization can monitor in real time important workforce measurements such as attrition rates, overtime trends, salary distribution, or department specific risks (Davenport 2014). This integration not only provides a thorough understanding of our workforce dynamics but also provides self-service analytics to HR constituents – those within the HR organization and department managers – allowing them to independently access the data, query, run reports or identify emerging trends, without relying on IT support. However, the implementation of such a platform provides increased transparency and reduces response times, enabling management to actively tackle retention issues. At last, this approach enhances the power of decision making, promotes a data driven culture of managing and profits leadership and employees by enabling timely and focused intervention to prevent attrition and improve organization's health.

Recommendation 2: Create Predictive Analytics for Attrition Risk

Machine learning models such as logistic regression or decision trees, can be implemented to predict high risk employees of attrition from historical pattern in current workforce data – which provide immense strategic value to ConnectLab (Bersin, 2019). Predictive models act as an early warning system, increasing the chances of finding employees who are more likely to 'exit' the organization, before they do so, and offer timely and focused interventions. With these insights in hand, management can create individual or group retention plans, e.g., adjusting compensation or providing individual career opportunities for those most likely to leave. Additionally, these models support a continuous improvement, as they can be gone back to and enhanced with new data over time to deliver an ever more

accurate result. In addition to this, the overall benefit of this approach is reduction of employee turnover, reduced recruitment and onboarding costs and retention of valuable institutional knowledge that directly leads to enhanced business performance and organizational stability.

Recommendation 3: Implement Interactive Dashboards for Stakeholder Engagement

As one strategic approach to boost workforce analytics at ConnectLab, we developed role specific and interactive dashboards for executives, HR professionals, and department managers based on actionable KPIs and targeted visualization. And these dashboards can be configured to show the most important metrics for that particular stakeholder. In this case, for instance, it will enable a department head to easily check through attrition trends for his team, while it allows HR to see organization wide trends. With dashboards including donut charts, packed bubbles and bar graphs, the data becomes quickly digestible, easily accessible and actionable (Knaflic, 2015). Moreover, these dashboards are interactive so that users can perform ad hoc scenario analysis to see what the impact of interventions like salary increase or reduced overtime might be on future attrition rates. Another big benefit is that this capability not only encourages a data driven culture within the organisation but it also increases accountability and allows faster decision making. However, when they finally do adopt tailorable, interactive dashboards, they are able to better react to retention problems, which leads to increased employee engagement and organizational performance.

7. Conclusion

Through this report, we conducted a thorough, data driven analysis of employee attrition at ConnectLab. Through the use of enhanced visualizations and business

intelligence methodologies we are able to pinpoint which departments, demographics, and conditions of employment are most at risk for turnover.

To prove the point, the Employee Attrition Insights Dashboard for ConnectLab uncovers several important trends that are of critical importance to attend to know. The Technology and Sales organizations, in particular, are seeing the highest attrition rates, identifying them as organizational hotspots wherein turnover represents a tangible threat to project continuity and client relationships. Moreover, the data also suggests that employees in lower salary slabs and those working overtime are much more likely to leave, indicating that compensation as well as workload are material risk factors. Furthermore, attrition is higher among Marketing and Technical department employees, as well as among employees under 22 and aged 21 to 27, thus necessitating evidence driven engagement and development approaches for these groups. In addressing these challenges, three strategic business intelligence recommendations are proposed.

First, centralize data and analytics to power real time, integrated monitoring of workforce trends and risks; second, apply predictive models to proactively discover and support workers at greatest risk of separation; and third, enable line executives, HR and department managers with interactive dashboards to access information that is specific and actionable to their needs. Incorporating these BI approaches, ConnectLab can overcome attrition, foster employee happiness and secure its competitive edge within the technology domain.

8. References

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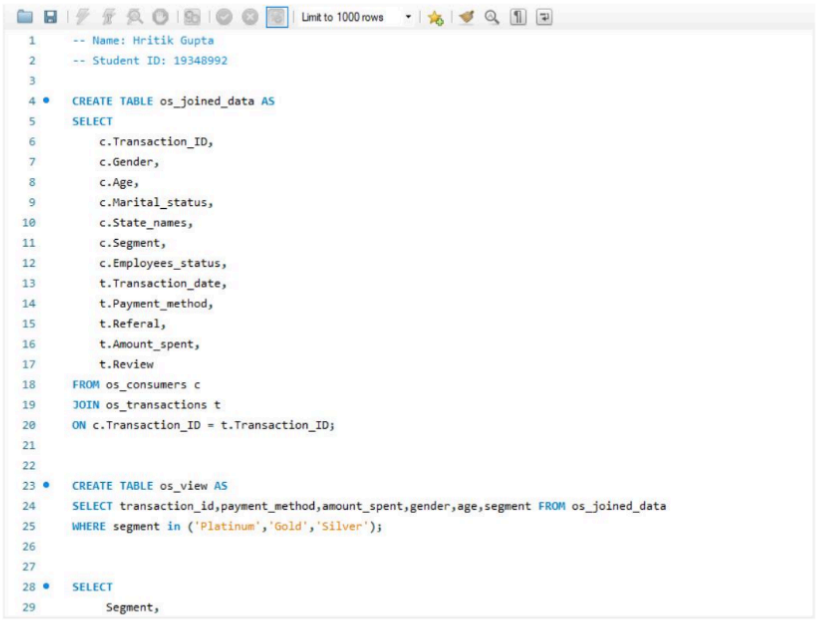
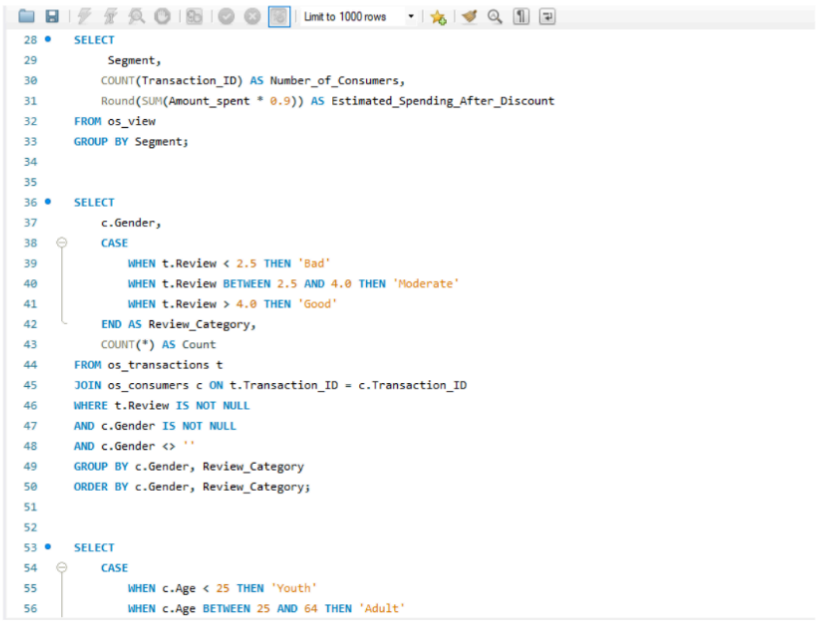
9.Appendix-

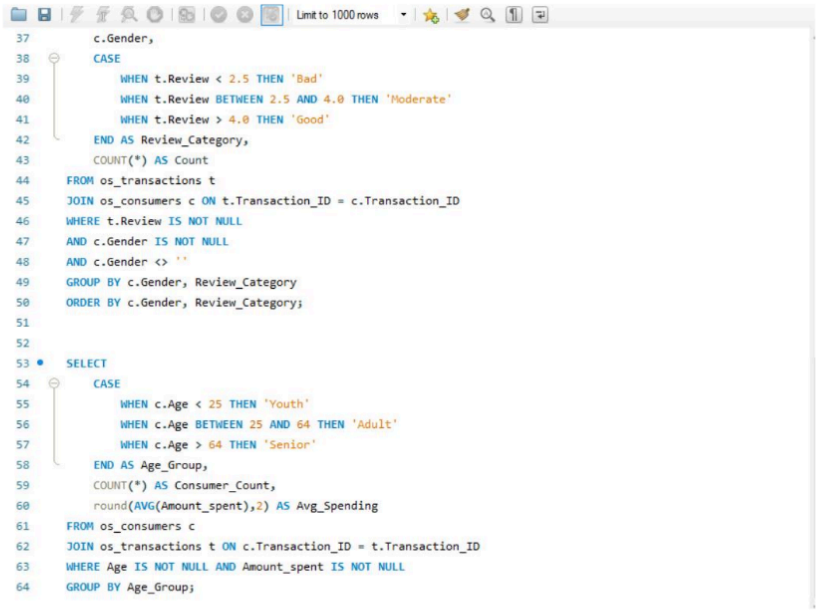
SQL Assessment:



```sql
-- Name: Hritik Gupta
-- Student ID: 19348992

CREATE TABLE os_joined_data AS
SELECT
    c.Transaction_ID,
    c.Gender,
    c.Age,
    c.Marital_status,
    c.State_names,
    c.Segment,
    c.Employees_status,
    t.Transaction_date,
    t.Payment_method,
    t.Referal,
    t.Amount_spent,
    t.Review
FROM os_consumers c
JOIN os_transactions t
ON c.Transaction_ID = t.Transaction_ID;


CREATE TABLE os_view AS
SELECT transaction_id,payment_method,amount_spent,gender,age,segment FROM os_joined_data
WHERE segment in ('Platinum','Gold','Silver');


SELECT
     Segment,
```



```sql
SELECT
    Segment,
    COUNT(Transaction_ID) AS Number_of_Consumers,
    Round(SUM(Amount_spent * 0.9)) AS Estimated_Spending_After_Discount
FROM os_view
GROUP BY Segment;


SELECT
    c.Gender,
    CASE
        WHEN t.Review < 2.5 THEN 'Bad'
        WHEN t.Review BETWEEN 2.5 AND 4.0 THEN 'Moderate'
        WHEN t.Review > 4.0 THEN 'Good'
    END AS Review_Category,
    COUNT(*) AS Count
FROM os_transactions t
JOIN os_consumers c ON t.Transaction_ID = c.Transaction_ID
WHERE t.Review IS NOT NULL
AND c.Gender IS NOT NULL
AND c.Gender <> ''
GROUP BY c.Gender, Review_Category
ORDER BY c.Gender, Review_Category;


SELECT
    CASE
        WHEN c.Age < 25 THEN 'Youth'
        WHEN c.Age BETWEEN 25 AND 64 THEN 'Adult'
```



```sql
    c.Gender,
    CASE
        WHEN t.Review < 2.5 THEN 'Bad'
        WHEN t.Review BETWEEN 2.5 AND 4.0 THEN 'Moderate'
        WHEN t.Review > 4.0 THEN 'Good'
    END AS Review_Category,
    COUNT(*) AS Count
FROM os_transactions t
JOIN os_consumers c ON t.Transaction_ID = c.Transaction_ID
WHERE t.Review IS NOT NULL
AND c.Gender IS NOT NULL
AND c.Gender <> ''
GROUP BY c.Gender, Review_Category
ORDER BY c.Gender, Review_Category;


SELECT
    CASE
        WHEN c.Age < 25 THEN 'Youth'
        WHEN c.Age BETWEEN 25 AND 64 THEN 'Adult'
        WHEN c.Age > 64 THEN 'Senior'
    END AS Age_Group,
    COUNT(*) AS Consumer_Count,
    round(AVG(Amount_spent),2) AS Avg_Spending
FROM os_consumers c
JOIN os_transactions t ON c.Transaction_ID = t.Transaction_ID
WHERE Age IS NOT NULL AND Amount_spent IS NOT NULL
GROUP BY Age_Group;
```

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