

## National College of Ireland

### Project Submission Sheet – 2022/2023

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**Word Count:**

I hereby certify that the information contained in this (my submission) is information pertaining to research I conducted for this project. All information other than my own contribution will be fully referenced and listed in the relevant bibliography section at the rear of the project.

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**Signature:** Aayush Aggarwal  
**Date:** 05/12/2022

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**Abstract** - Employee attrition is one of the most critical areas for any organization to invest its time and resources in due to its adverse effect. Due to the market Globalization and growing technology companies are devoting more and more resources to building their human capital which include talented and hardworking people. Employee attrition is major threat for these companies as it directly affects their workplace effectiveness and plans of growth in future. It also has a major impact on the strength of the company in market. Keeping this mind, IBM has hired us to analyze their attrition problem. In this report we have introduced a dashboard which was created Tableau on the data provided by IBM. This report also tries to introduce the factors which are affecting the attrition rate of the company and provides insights through the means of dashboard. It will help IBM's top management to make key decisions regarding the attrition problem and help them tackle it so that they can manage their business in competitive environment effectively.

## I. DEVELOPMENT PROCESS

IBM has hired us to analyse their increase in attrition issue and has asked us to provide a solution so that they can take necessary steps to reduce it. We have followed following steps in our development process: -

1. Analysing Raw Data
2. Pre-Processing the raw dataset
3. Using Tableau for Data Visualization

In the process of Analysing the raw data we found out that IBM has provided us the data in the form of 4 different files. These files had the data related to attrition from January 2022 to November 2022. But these files had some data inconsistencies so we did some data cleansing processes which involved removing duplicate rows and removing 'NA' values. After cleansing the files, the only problem remaining was that these files needed to be connected to be analysed further. While going through files we had found out that each of the files had one column 'Employee Number' common so we decided to use that column as our key to join the files into one single table. To join those files using the primary key we used 'MySQL Workbench'. We joined all the files into one single table using join method in SQL. After the table was created it needed to be connected to a visualization tool to perform analysis so we connected the 'MySQL Workbench' with Tableau Desktop so that Tableau can access the final table. Once the connection was successful we were able to do create multiple charts and dashboard for further analysis. We created in total 8 charts in the dashboard which helped the viewer to understand the relationship between different attributes of the data and attrition rate.

## II. VISUALISATIONS

### A. DEPARTMENT

#### 1) Implementation

Every company has its own set of departments. These departments usually deal with a certain area of work or business. Similarly, IBM consists of mainly 3 departments named: - 'Human Resources', 'Research and Development' and 'Sales'. We have plotted here a custom-made Doughnut shaped graph which indicates the relationship between

Departments present in the company and the attrition rate in that department. The Fig 1 given above illustrates about the percentage of attrition with respect to total number of people present in that department. Here 'red' color in the figure indicates attrition rate percentage and the blue figure indicates percentage of Active employees. We have also implemented the tooltip which provides the information about the selected area when you put cursor on it. This information includes Department Name, Attrition/Active Employee Rate, and '% of Attrition/Active Employee' rate.

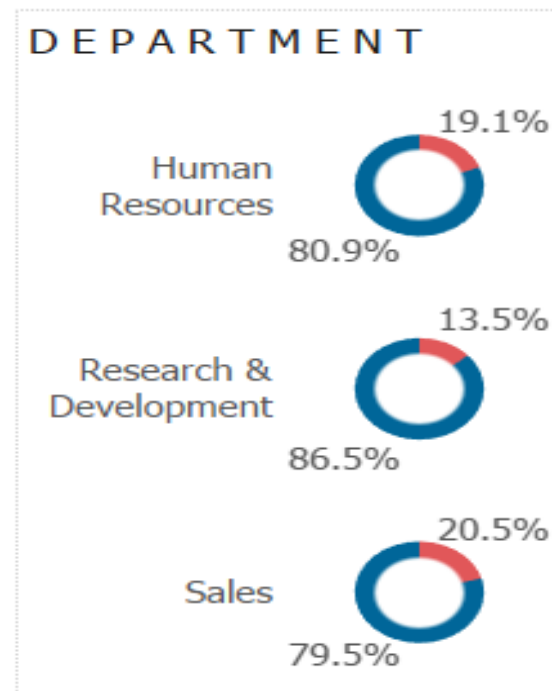


Fig.1 Department vs Attrition rate

#### 2) Insights

As we can see in Fig. 1 There is a high attrition rate percentwise in 'Sales' department which is 20.5% as compared to other departments. 'Human Resources' department stands at second place with attrition rate of 19.1% and the 'Research and Development' department has the lowest attrition rate among all the departments with 13.5%. Similarly, the Active employee rate in 'Research and Development' is the highest which is 86.5%. The other departments 'Human Resources' and 'Sales' stand at second and third position with 80.9% and 79.5% of Active employee rate respectively.

### B. JOB ROLE

#### 1) Implementation

Every company divides its employees as per their job roles. These job roles are decided as per the key skillsets of the employee. In the dataset provided by IBM there are 9 job roles in total. These job roles are as follows: - 'Healthcare Representative', 'Human Resource', 'Laboratory Technician', 'Manager', 'Manufacturing Director', 'Research Director', 'Research Scientist', 'Sales Executive', 'Sales Representative'. We have plotted here a customized stacked bar where we have represented a relationship between total number of attritions and total number of active

employees in each job role. Here the values present in red box shows the total count of attrition in that job role and blue box represents the total count of active employees. Fig. 2(a) in above figures represents information about first 5 job roles and Fig. 2(b) represents information about all the job roles present.

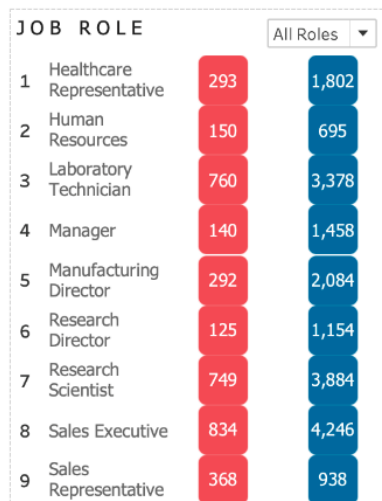
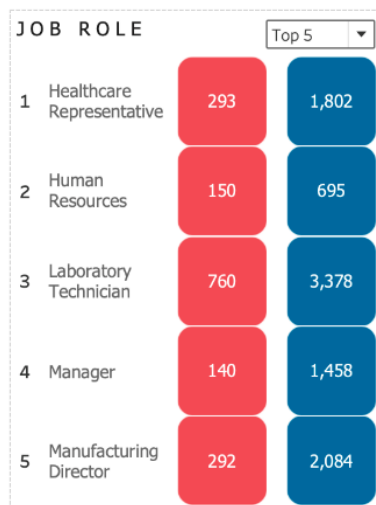


Fig2. A. and B. Job Role vs Attrition rate

## 2) Insights

As we can see in Fig.2(b) job roles such as ‘Laboratory Technician’, ‘Research Scientist’ and ‘Sales Executive’ have the highest number of counts in terms of active employee numbers. These three job roles have covered almost 58% of job roles in IBM. As per the Fig.2(b) ‘Sales’ department has a highest attrition rate with 368 employees leaving with respect to 968 current employees. This accounts to 28.17% of attrition rate with respect to total employees in that job role. Similarly, there is higher attrition rate in job roles of ‘Laboratory Technician’ and ‘Human Resources’ as well with 18.36% and 17.75% of attrition rates in comparison to total employees in that job role respectively. As per the insights we could get, job role of ‘Manager’ has the lowest attrition rate with only 140 employees leaving with respect to 1458 active employees. This accounts to the attrition rate of only 8.76%. The job role of ‘Manager’ is followed up by job roles of ‘Research Director’ and ‘Manufacturing Director’ with lower attrition rates of 9.77% and 12.28% respectively.

## C. GENDER

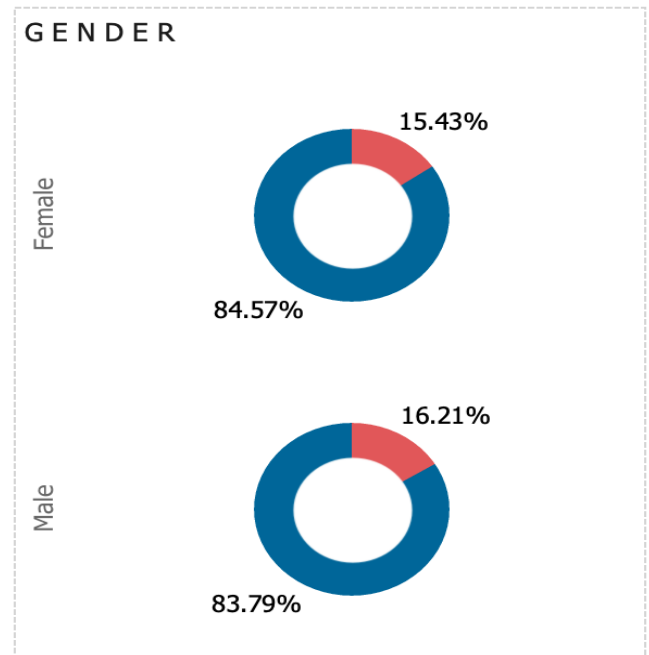


Fig. 3 Gender vs Attrition rate

### 1) Implementation

Every organization hires individual of different age groups and sex based on their experience and the type of requirement in the various department. Overall, the above Fig.3 shows the division of employees based on gender. We have implemented two doughnut charts of the male and female employees in IBM. In this Fig. ‘red’ color shows the employees who have left the organization and ‘blue’ indicates the total number of employees currently working.

### 2) Insights

In the above chart, it is clearly shown that males have high attrition rate of 16.21% as compared to females who have rate of 15.43%. We have also implemented a tool tip which further shows the insight and give us detail description. At the same time, there are a greater number of active male employees in IBM counting to 11,748 than the female employees who are 7,893.

From the individual charts, it is seen that there are 84.57 percentage of active female employees in the organization whereas on the other hand there are 83.79 percentage of male employees currently working.

## D. AGE GROUP

### 1) Implementation

In IBM we have employees of different age groups ranging from one’s with age less than 25 to mid aged (30-40 years) to senior levels with age greater than 45 years. There can be students who are pursuing internship or are hired from universities through campus placement, to the employees who have experience from previous organization. The below Fig.4 shows the nested bar graph of different age groups ranging from 18 to greater than 55 years. For individual group, we have created a bin and performed the grouping in tableau. So, in total there are 5 bins which corresponds to 5 different age groups. Also, we have categorized the graph

into 2 different colors, namely 'grey' for total number of active employees and 'red' for the number of employees who have faced the attrition.

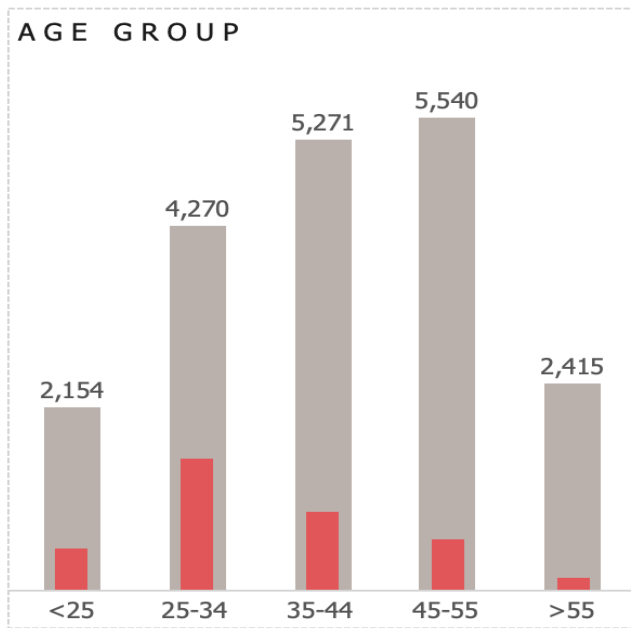


Fig.4 Age group vs Attrition rate

## 2) Insights

At a first glance, it is seen that there are 5,540 employees who are currently working for IBM in age group 45-55 years which is highest amongst all the groups. This is then followed by 5,271 for age group 35-44 and the least number of employees in age group less than 25 which is 2,154. On the other hand, age group 25-34 has the maximum attrition of 1,551 employees which is around 41.78% of the total percentage of attrition in the year 2022. This number decreases as there are an increase in age group and the least number of employees who left the organization counts to only 159 in age group greater than 55 (about 4.28% of the total percentage of attrition).

## E. EDUCATION

### 1) Implementation

In the *Horizontal Bar* chart (in Fig.5) we have tried to visualise how different Education Fields of the employees affected the attrition number of the company. Here we have taken different education levels of the employees as our variables of interest and plot the horizontal bars individually where the red colour signifies the attrition count and the blue colour represents the number of current employees.

### 2) Insights

Here we can see that a significantly large number of Employees with Life Science background have left the company (1,385 out of 9,689) as compared to the employees with other backgrounds, namely, Medical, Marketing, Human Resources etc. In every 100 employees, nearly 15 employees tend to leave the company having a medical background whereas for Human Resources background, this number rises to 17%.

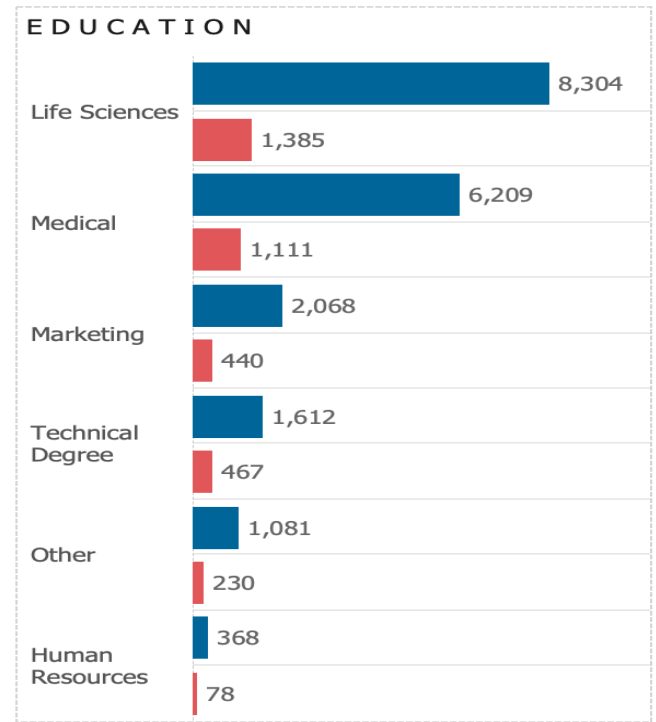


Fig.5 Education vs Attrition rate

## F. ATTRITION TREND

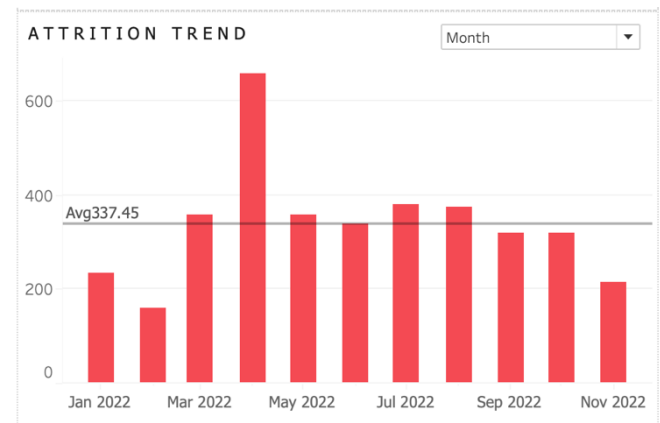


Fig. 6 Month vs Attrition count

### 1) Implementation

To control the attrition rate, the primary part is to check the attrition trend for a particular company. Here in the above *Vertical Bar* chart (in Fig.6) we have tried to visualize the attrition count of the company on a weekly, monthly, quarterly, and yearly (only 2022) basis and incorporated the *Average Attrition Measure* for each type.

### 2) Insights

From the above chart (in Fig.6) it is clearly visible that the number of attrition was highest in the month of April, 2022 (about 658 employees) whereas the company has faced the lowest in February, 2022. There was a significant fluctuation at the beginning of the year but it gradually decreased at the end resulting in the average number of attrition counts 337.45 on a monthly basis.

## G. SURVEY ANALYSIS

### SURVEY SCORE

Score >>	1	2	3	4
Environment Satisfaction	3,680	3,789	6,097	6,076
	889	741	1,059	1,022
Job Satisfaction	3,699	3,731	5,914	6,300
	886	693	1,171	959
Job Involvement	993	4,904	11,750	1,994
	318	1,052	2,064	278
Relationship Satisfaction	3,592	4,171	6,094	5,787
	779	649	1,202	1,081
Work Life Balance	1,015	4,567	11,998	2,061
	254	901	2,191	366

Fig. 7 Survey Score

#### 1) Implementation

To perform better than the past, every organization conducts surveys on a timely basis to check how they are performing and where they need to improve. The organization sends various surveys to their employees and keep eye on the scores they have received from the employees. Most of the surveys related to the environment, job satisfaction and work-life balance, etc. With this survey, organizations observe the scores of the surveys and identify the areas where they need to perform or improve. Similarly, we as a business intelligence team gather all the imported information for the business and present the numbers through visualization so management can easily understand the problem areas and take the decision accordingly. For the survey, I have considered 5 variables: environment satisfaction, job satisfaction, job Involvement, relationship satisfaction, and work-life balance.

#### 2) Insights

In the above visual screenshot, we have considered all the survey scores and distributed the scores into two categories. We have two legends in the visual, 'Blue' color indicates the active employees and 'Grey' color indicates the attrition. In addition, we used a heat map for the active employees which indicates the highest score in each category. As per the visual screenshot, employees are given the highest scores for the '3' option of environment satisfaction, '4' option of job satisfaction, '3' option for job involvement, '3' option of relationship satisfaction, and '3' option of work life balance. However, we have seen significant numbers in the '1' score of each survey which means organizations need to identify the possible ways to improve in this area.

## H. RECENT ATTRITION

### RECENT ATTRITION

Emp. No.	(All)	(All)
IBM_11	Attrition date: 11/18/2022	^
Manager	Avg. Satisfaction Score: 3.200	
Sales	Performance Rating: 3	
	Monthly Income: 14,756	
	Salary Hike: 14%	
IBM_1344	Attrition date: 11/18/2022	
Research Scientist	Avg. Satisfaction Score: 2.400	
Research & Development	Performance Rating: 3	
	Monthly Income: 2,960	
	Salary Hike: 11%	
	Attrition date: 11/18/2022	v

Fig. 8 Attrition Summary

#### 1) Implementation

Organization's management wants to see the overall performance of the organization in the current year however they are more concerned about the present scenario and the various factors impacting their brand value. We have considered various factors to represent a summary for management which helps them to conclude the closest reason for an employee's resignation. To develop this summary report, I have considered satisfaction score, performance rating, monthly income, and salary hike.

#### 2) Insights

We have represented a summary of recent attrition which express the satisfaction score, performance rating, monthly salary, and salary hike. In this summary report, we can see the employee number and conclude a possible reason based on the numbers of that employee number. For example, if we see the monthly salary and salary hike output. We can identify that there should be a relation and it may indicate an attrition reason.



### III. IBM ATTRITION DASHBOARD

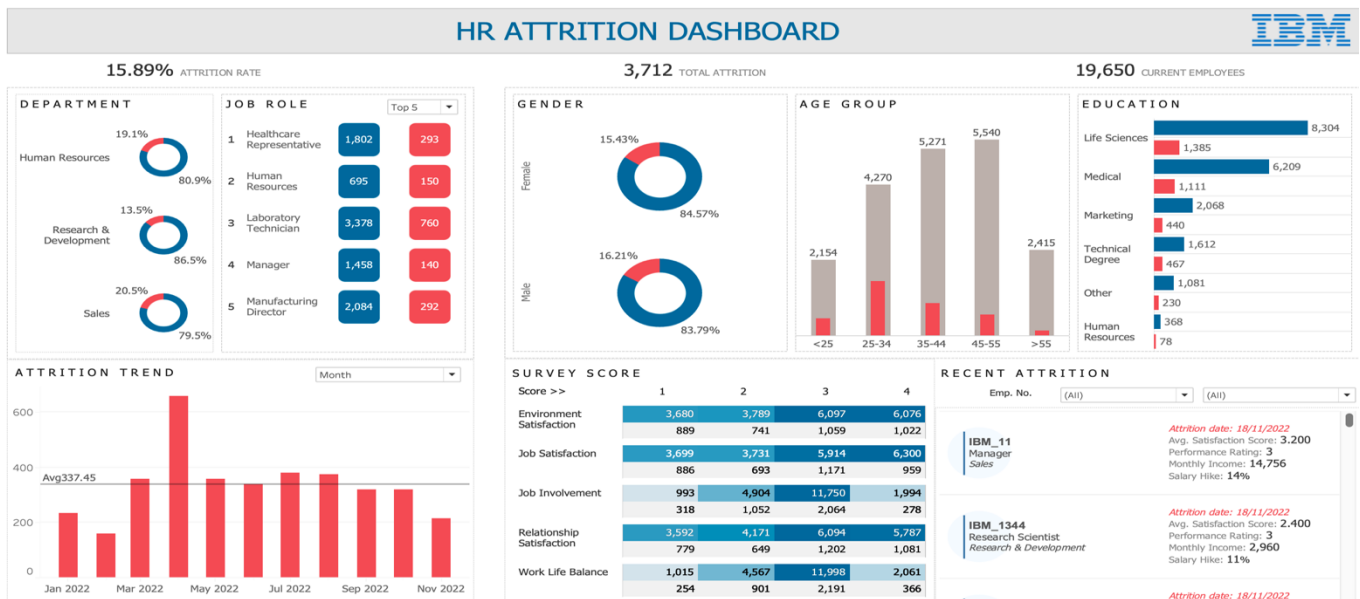


Fig.9 IBM Attrition Dashboard

### IV. BUSINESS SOLUTIONS

1) IBM should keep track of managers who are facing higher attrition rates because if the rate of attrition is higher under any particular manager that means there is some issue with the team environment. People under bad higher management tend to leave the company early. This can be avoided by taking some precautions such as revisiting the employee hierarchy from time to time to take inputs from employees about the workplace environment which will help the higher authority to find out the patterns of employee leaving and allow them to take actions accordingly. IBM should have zero tolerance for bad management behaviour as it destroys the employee faith in the company. IBM should keep an eye on employees who are potentially threatening of leaving by conducting surveys as it's easy to influence their choices more than someone who has already decided to leave.

2) As per the data we received from IBM, we found out that employees aged between 25 to 35 have a tendency to leave so to avoid this IBM should keep on encouraging the employees by providing them incentives and clear paths to promotions based on their talent and hard work. IBM should keep both young and old talent in mind while envisioning the future of the company.

3) The sales department at IBM is having the highest attrition rate. IBM should invest more in this department. IBM should go with a strategy which allows them to recognise and promote the talent in the company by not only the sales results but also by analysing their performance in development programs. These development programs should be based on the actual skills of employees and their behaviour. This will allow employees to build trust in the company that they will be recognised and awarded appropriate rewards in the form of incentives and promotions. This might help in reducing the attrition rate.

4) IBM can reduce the attrition rate in any department by conducting exit interviews and allowing employees to be honest. By analysing the reviews from past employees' the company should try to create a more employee-centric culture by trying to provide what skills and tools are needed. Instead of just focusing on numbers companies should take care of their employees by getting to know them as human beings and understanding their needs and expectations.

### V. CONCLUSION AND FUTURE SCOPE

Employees are an integral part of an organisation and having high employee attrition rate in a company demolish their value in the market. Large firms may lose skilled employees, lose knowledge, and become mired in a never-ending cycle of recruiting new employees which ultimately hampers company's growth.

To address IBM's high attrition rate, we have provided visual insights and useful business solutions in this study. 3712 employees departed the organisation during the current year, which ran from January 2022 to November 2022, accounting for 15.89% of the attrition rate. Despite the difficulty in defining a healthy attrition rate, businesses should strive for an attrition rate of less than 10%. In this research, we offer IBM business solutions in the hopes that they would drop their attrition rate below 10%.

Our project can help companies to find possible reasons for employee attrition and prevent valuable employees from leaving the company in future. Through our study, companies can also visualize the employee's ratings and performances so that the employees with a high-performance rating can be encouraged further by giving salary hikes, benefits etc. We can also try to build a predictive model based on this attrition data to help the company be prepared for the future employee loss count.