

National College of Ireland

Project Submission Sheet – 2022/2023

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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
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Date: 05/12/2022
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Abstract - We have been hired by an IBM organization as a business analyst to increase the efficiency in the business areas and strengthen their processes. As soon as we were hired, we were given the responsibilities of solving the major issue of high attrition rate which the company is facing recently in various departments of its business. This in turn is leading to numerous difficulties, including workload distribution, the creation of new initiatives in their various sectors, and the maintenance of existing ones. We will examine the crucial areas where IBM must think critically and act appropriately to reduce overall attrition while motivating their current workforce through innovative approaches to support the organization. We have created an analytical dashboard to highlight the most severely affected regions, analyze the different aspects of attrition including the employee's background and their job role. Based on our analyses, we could then help the Human Resource department gain insightful information and concrete recommendations. This will also aid the company in keeping its employees for a longer period and enhance its reputation in the market as an employer of choice.

I. INTRODUCTION

A. Company Background

IBM (International Business Machines Corporation) is an American multinational corporation. It is operated in 171 additional countries in addition to its headquarters in New York. IBM in their earlier years is best known for producing and selling hardware and software and in later stages they started growing in the field of cloud computing and data analytics. It is also the oldest company which started using a mainframe computer system, which has then revolutionized the IT industry by allowing customers to store large data and their applications into a single store system. Nowadays, they are providing consulting services and supplying their products ranging from mainframes to chips and nanotechnology to other multinational companies. Seeing their recent value and reputation in the IT sector, we as a Business Analyst should try to resolve the issue of high attrition which the company is facing recently. Before we dig deep into this, we must know the major reasons of why the employees are leaving the organization by recognizing the factors that are causing the high attrition rates.

B. About Attrition

Attrition terminology means the reduction in their staffs and employees by various means such as voluntary resignations, growth in the employee's career in respect of their technological skills and personal development, lack of facilities provided by the company or the unsustainable working environment within the organization. A periodic reduction of employees is acceptable in a company, and they have also set a standard rate of it, but the problem arises when this rate becomes unevenly high, and it starts affecting their working environment and takes a toll on their reputation. This might also lead to the reduction of the company total annual revenues and could also affect the relationship between their stakeholders.

This attrition not only involves the loss of their employees but also leads to diffusion of time and resources spent on the individual's training and knowledge sessions. This can be very well correlated with the junior employees who takes a monetary effort of the organization, they could have grown to senior positions and bring in their expertise in critical decisions. On the other hand, the removal of employee from upper management results in imbalance of whole team. So, any level of attrition brings in the consequences within the organization.

Sometimes the attrition could also save the company from mass layoffs, as they balance in some circumstances. And here comes the role of Business Analysts who assists HR by conveying the insights and help them retain valuable employees of the company.

C. Reasons of Attrition [1]

There are several factors that can contribute to high attrition rates. Some of them are listed below -

1) *Growth and Development* - People today place a high importance on self-development, so someone who feels that they are stuck in the same position with little possibility for advancement will probably start looking for opportunities elsewhere. In fact, as per many reports on attrition rates around 80 to 85 percent of employees would have still stayed at their jobs longer if their employers supported their professional development.

2) *Poor Workplace Culture* - Organisation can only bring out the best from their employees if there is a good relationship between the manager and their team members. The toxic culture is the leading reason of attrition which not only affects the working environment but also the mental health of the employees.

3) *Pay* - This should be simply one among a number of factors that keep employees with a company. If an employee is not paid based on their efforts and contribution, then it is more likely than they would leave a job and switch to other company that provides a better fair compensation.

4) *Stress* - This is the significant issue which has large impact on the organisation as well as the employees. The stress at workplace may also lead to increase in problems in their personal lives.

5) *Flexibility* - Employees across various departments in the company should prioritize on flexible practices including the remote work and flexible hours. There should not be restrictions and pressure from the managers. By following this we can bring out the best from our employees and they can also think proactively and contribute more.

D. Marketplace [3]

IBM generates its revenue through multiple business segments such as GTS (Global Technology Services), GBS (Global Business Services), GFS (Global Financing Services) and Software Services.

1) *GTS (Global Technology Services)* - GTS Services of the IBM works on providing hybrid – cloud infrastructure and various business process services so that it can fulfil the requirements of clients. It provides a platform to help meet the new requirements which are usually related to multi cloud and enterprise Artificial Intelligence Workload. GTS offers the hardware such as High-end servers, cloud infrastructures which can be used as IAAS platform and optimised storage solutions. IBM's infrastructure is considered as robust, Scalable and easy to use which is able to provide clients with end to end services which helps them maintain the business.

GTS provides following services - Strategic Outsourcing, Global Process Services, Technology Support Services, Integrated Technology Services, Cloud Services.

The Infrastructure segment in GTS provided revenue of \$14.2 billion which was nearly 25% of the total revenue of the last financial year 2021. Out of \$14.2 this segment generated \$7.8 billion in gross profit.

2) *GBS (Global Business Services)* - GBS tries to provide the expected business results to the clients. When different organizations grow with time their increase in usage of technology and platforms becomes costly to manage. This makes things difficult for the organizations. GBS tries to help tackle these problems by providing the best ways to drive cost saving and increase total revenue through multiple business services. Some of the service areas are as follows -

a) *Consulting* - Consulting segment in GBS helps client to design and transform their business with the help of compatible solutions in strategy and transformation field. This segment provides services such as Expertise on Business, Finance, Technology, Marketing, Supply chain etc. Consulting helps to design and create open, hybrid cloud structures which enhances workflows and business processes with IBM and ecosystem partner technologies. Consulting Segment of GBS works mainly in 3 areas: Business Transformation, Technology Consulting, Application Operations.

b) *Application Management Services* - IBM's Application Management Services Segment provides many kinds of services such as Application Management, Support Services for packaged software's, Maintenance of software's, Support for custom and legacy applications. This segment offers advance services such as testing of applications, upgrading of applications and robust cloud services. Application Management Services also include global process service which provides services such as processing platforms and process outsourcing.

This segment generated the revenue of \$17.8 Billion during the year 2021 which was more than 31% of the total revenue at that time. This segments net profit was of \$5 billion in year 2021.

3) *GFS (Global Financing Services)* - By offering financing options in the IBM areas of specialization, IBM Global Financing makes it easier for IBM clients to purchase IT systems, software, and services. IBM provides these services for the products and facilities which are critical to the end users. This segment invests in products and services such that it loans and controls them in order to produce high returns on stocks with minimal risk. Global Financing benefits from having both a thorough understanding of its clientele and a comprehensive understanding of the goods and services that are being financed which at the end results in generating the high returns.

There are three main global financing Capabilities: - Client Financing, Commercial Financing and remanufacturing and remarketing.

a) *Client Financing* - Global Financing Services provides facility of loans and leases from one to seven years to its clients and end users. These loans and leases are mainly provided on assets which are new or used software, hardware and services where IBM has expertise.

b) *Commercial Financing* - Commercial financing includes finance for short periods for inventories and accounts receivable for IT product resellers and dealers of IBM.

c) *Remanufacturing and Remarketing* - After the lease is up, the company's equipment is returned, reconditioned, and made accessible for new or existing clients both internally and externally, which aids in generating revenue.

Finance segment of IBM generated \$774 million of profit in year 2021 which accounted more than 1% of total revenue generated by all segments. Its gross profit of the year was \$245 million.

4) *Software Services* - IBM provides help services to those who require them. Through the modernization, automation, and security of their environments as well as the provision of their data needs, IBM's software division assists clients and end users. Software services mainly consists of middleware software. This software is used by clients to mainly combine their processes and systems on one particular software platform. The combining ultimately helps in improving the results, gaining competitive advantage and solving critical problems. Operating system software is a different class of software service. Computers run on operating systems, which are pieces of software.

There are three many types of software capabilities - WebSphere Software, Information Management Software, and Watson Solutions.

a) *WebSphere Software* - Provides capabilities to run high end applications.

b) *Information Management Software* - Provides facility of integrating, analysing large amount of data from variety of sources.

c) *Watson Solutions* - It is integrated with Information Management Software. It's a computing platform which has many specifications such as interacting in natural language and process huge volume of data.

Software segment of IBM generated \$24.1 billion of revenue in fiscal year 2021 where it was able to account for 42% of total revenue generated by all the segments. The gross profit of this segment was \$19 billion in the year 2021.

E. Scope of Process

1) The Importance of study -

a) The study will help the company understand how the attrition rate fluctuations affect the organization's work.

b) To know the reason behind turnover of the employees and suggesting the senses to overcome for the same.

2) The objective of study -

a) The primary objective of the study is to find out appropriate information about employee attrition in IBM and to study the diverse reasons which are responsible for employee attrition.

b) To analyse the data collected by exit interview, through structured questionnaires and draw out conclusions.

c) To ascertain the level of employee engagement, so that sensitive areas prone to attrition could be known.

II. SYSTEM DESIGN

A. Data Capture Points

Our final structured data contains 23,364 rows and 38 attributes but an analytical dashboard has been prepared on the following 16 attributes as shown in Table 1 along with the attrition status.

ATTRIBUTES NAME	DESCRIPTION
Department	Departments of the Employee
Job Role	Employee Job Role
Gender	Gender of the Employee
Age	Age of the Employee
Education Field	Educational Background of the Employee
Employee Number	Unique Number Associated with each Employee
Employee Last Date	Last Date at the Company for each Employee
Attrition Month	Last Month at the Company for each Employee
Environment Satisfaction	1- 'Low' 2- 'Medium' 3- 'High' 4- 'Very High'

Job Involvement	1- 'Low' 2- 'Medium' 3- 'High' 4- 'Very High'
Job Satisfaction	1- 'Low' 2- 'Medium' 3- 'High' 4- 'Very High'
Work-Life Balance	1- 'Bad' 2- 'Good' 3- 'Better' 4- 'Best'
Relationship Satisfaction	1- 'Low' 2- 'Medium' 3- 'High' 4- 'Very High'
Performance Rating	1- 'Low' 2- 'Good' 3- 'Excellent' 4- 'Outstanding'
Monthly Income	Monthly salary of the Employee
Percent Salary Hike	Percentage Salary Hike for the Employee

Table.1 Data Capture Points

B. Analytical Requirement

Our primary objective is to find out what factors are affecting the employee which makes them leave the organization voluntarily. The other objectives we are trying to answer are -

1) What can be done to prevent that from happening which will help the organization to retain their valuable employees.

2) Provide solutions to organization which will help them reduce the unwanted attrition risk.

Here we have proposed a dashboard which has been named as 'HR Attrition Dashboard'. This dashboard consists of 8 different types of charts. Each chart in this dashboard indicates different attributes which are affecting the attrition rate in the organization. The dashboard consists of charts such as 'Department' wise Attrition Rate, 'Job Role' wise attrition rate, 'Age Group' wise attrition rate etc.

C. Design Tools and Application

When we were able to understand the project requirements and find out the objectives which we were needed to take care of, we decided the tools we were going to use. As our data was split into 4 different files we decided to use 'MySQL Workbench' to merge that data into a single file. Later we have used 'Tableau' for creating the dashboard which would help us in getting the insights of the data.

1) *MySQL Workbench* - MySQL Workbench is a relational database management system tool. It's a free and cross platform admin tool which is primarily used by

developers, database managers for performing the actions such as database modelling, SQL development etc.

2) *Tableau* - Tableau is a data visualization tool. This tool is an analytical tool which allows businesses to get crucial insights from the data which helps them in decision making. Tableau helps to create reports and dashboards using different charts and graphs. In our case our MySQL Workbench is connected to Tableau which helps us to refresh the dashboard when new data arrives automatically.

D. Key Points to Reduce High Attrition Rates [2]

Based on analyses performed by business analyst, HR should incorporate following practices to deal with attrition and benefit the IBM -

1) *Conducting training and knowledge sessions* - Whenever any employee joins the organisation they are provided with the project based knowledge sessions, which is required for their day to day work. But apart from this, manager or a team lead should ask their team members to rate themselves in the technical skills and maintain a spreadsheet of the same. Later on the basis of it, they should regularly conduct a training of that particular skills in which they lack. In this way all the employees will have self-development and can also grow professionally in their careers. This will also benefit the company as they can contribute vigilantly towards crucial tasks.

2) *Promote health and wellness* - IBM HR's should conduct wellness programs for all the employees across various departments. This can be incorporated by performing sessions for aerobics or gymnastics or asking them to take part in social events and gatherings. In this way employees can also communicate and get along with each other. This will not only build good relationships amongst themselves for better teamwork but will also make them happy and stress relief from their daily schedule.

3) *Rewards and Incentives* - On the basis of employees performance and reviews from their peer colleagues and team leads, managers should propose HR to give them rewards. These can be in the form of some goodies, gift vouchers or reward points which can be redeemed through company. These gestures make them feel special and recognisable and also motivate them. Another good gesture for the employees is to offer incentives to those who have contributed well towards their team by completing tasks within the deadlines and presented with ideas that improved the efficiency of business.

4) *Create a friendly environment* - Every employee want their surrounding's to be warm and affable. This is the biggest reason for them to leave the organisation as they don't feel comfortable. In order to cope this problem, every department's managers have a big role in it. It is their responsibility to create such environment where everyone can freely express their opinions and thoughts and these are

respected by everyone equally irrespective of their position. Another important aspect is to engage employees by having regular meetups and fun games.

5) *Integrate a warm offboarding* - IBM HR should plan hassle free offboarding for their employees who are leaving the organisation. This process should be incorporated in such a way that they feel like leaving on a good terms. This includes, showing them gratitude in the form of letters and well-wishing them for their next professional journey. In this way it will display a positive image of the company among employees and the competitors and this might also open the door for them to join the organisation again.

III. DATABASE DESIGN

A. Entity-Relationship Diagram

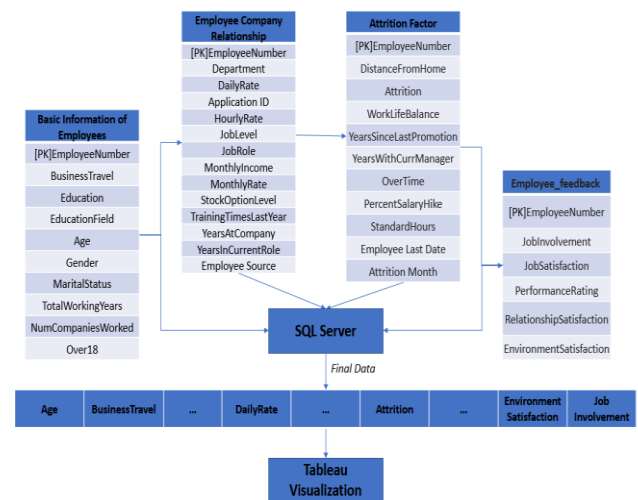


Fig.1 Entity-Relationship Diagram

B. Overall Workflow

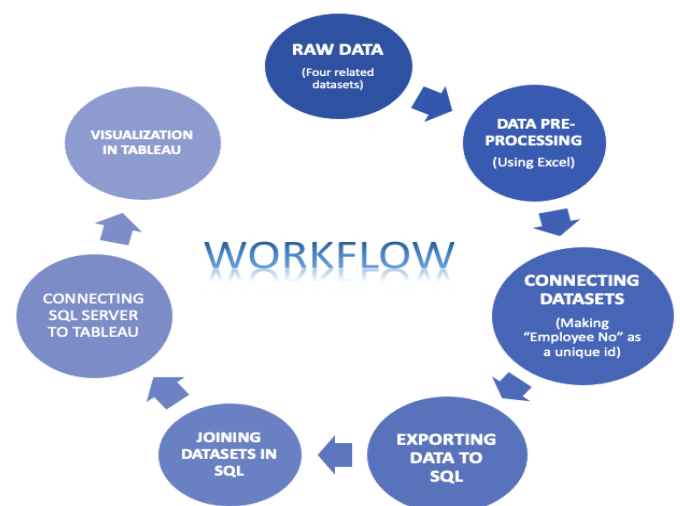


Fig.2 Workflow of the Project

We have been hired by the IBM organization as business analysts to analyse the major reasons for the increase in the company's attrition rate and to provide a solution to control

that. Our team has been given the attrition data of the company starting from January 2022 to November 2022. So the total workflow of our project (as shown in Fig.1) has been explained through the following steps –

1) *Raw Data* – Our team has been given the company’s attrition data in the form of four different CSV files. A brief explanation of each of the four data files is as follows –

a) *Basic information about the employees* – In this data file we have all the general information about the employee, those who are currently working as well as who has left the company, like ‘age’, ‘education level’, ‘education field’, ‘business travel’, ‘employee number’, ‘gender’, ‘marital status’, ‘total working years’, ‘number of companies worked’.

b) *Employee Company relationship* – Here we have all the job-related information for each employee like ‘application id’, ‘department’, ‘daily rate’, ‘employee number’, ‘hourly rate’, ‘job level’, ‘job role’, ‘monthly income’, ‘stock options level’, ‘years at the company’, ‘years at current role’, ‘last year training time’, ‘employee source type’, etc.,.

c) *Attrition Factors* – In this data file we have all the information on those variables on which the attrition rate of a company depends like, ‘distance from home’, ‘work-life balance’, ‘years since last promotion’, ‘years with current manager’, ‘percentage salary hike’, ‘average working hours’, ‘employee number’ and ‘attrition status’. Now additionally we have ‘employee last date’ and ‘attrition month’ for those employees who have left the company.

d) *Employee Feedback* – Here we have a list of feedback about ‘environment satisfaction’, ‘job involvement’, ‘job satisfaction’, ‘performance rating’, ‘relationships satisfaction’ corresponding to each of the ‘employee numbers’.

2) *Data Pre-Processing* – Each of the four related data files have been loaded in Excel and pre-processed thoroughly. All the duplicate data and ‘NA’ values have been removed and some of the rows containing blank spaces are also omitted from the datasets. Finally, all the data files have been structured properly for the ease of our analysis.

3) *Connecting Datasets* – Each of the four datasets has one common variable, namely ‘employee number’. So all the four datasets are relatable with this unique id.

4) *Exporting and Joining Datasets* – All four data files have been loaded to the SQL server and then joined using

‘employee number’ as a unique id as shown in Fig.2. Therefore a well-structured dataset containing all the relevant information about the employees, along with attrition status, is ready to go.

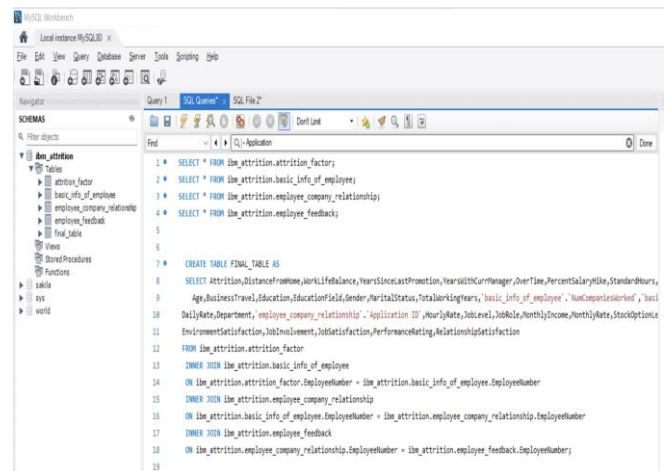


Fig.3 Exporting and Joining Datasets

5) *Connecting SQL Server to Tableau and Tableau Visualisation* – Finally, the SQL server has been connected to tableau and the dataset is loaded into Tableau Desktop for visualization.

IV. BIBLIOGRAPHY

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