

Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Information Technology



Bachelor Thesis

Project Management Techniques For Web-Based Projects

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BACHELOR THESIS ASSIGNMENT

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Informatics

Thesis title

Project Management Techniques For Web-Based Projects

Objectives of thesis

The primary objective of this thesis is to enhance project management for web-based projects through a comprehensive analysis of employee demographics and related factors. Specifically, the goals are as follows:

The thesis aims to identify factors contributing to employee attrition within the organization. Analyze job satisfaction levels among employees based on various demographic factors such as gender, generation, and proximity to the workplace. Determine the impact of employee demographics on project success and completion rates. Develop recommendations for improving project management strategies based on insights gathered from demographic analysis.

Methodology

To achieve the thesis objectives. A case study will be conducted on various organizations and their web-based projects. Different data analysis methods mentioned in our methodology will be used to address issues regarding attrition rates within the organization.

The purpose of this research study is to evaluate the job satisfaction and attrition rates within organizations. Additionally, the productivity results of these organizations will be examined to determine their overall efficiency. To gain insight into the employee's experience, the study will assess how prioritizing employee satisfaction and engagement, organizations can reduce attrition rates and promote smoother project execution. Furthermore, the research will investigate the main issues of attrition reasons encountered, providing valuable insights into areas for improvement. Finally, based on the study's findings, suggestions and conclusions will be made that can help organizations optimize project management practices for web-based projects, ultimately leading to improved project outcomes and employee satisfaction.

The proposed extent of the thesis

30-40

Keywords

Employee Attrition, Project Management, Web-Based Projects, Talent Retention Strategies, Team Dynamics, Recruitment Challenges, Project Complexity, Data Analysis, Imbalanced Dataset, Predictive Modelling

Recommended information sources

KERZNER, Harold. *Project management : a systems approach to planning, scheduling, and controlling*. Hoboken: Wiley, 2017. ISBN 978-1-119-16535-4.

PROJECT MANAGEMENT INSTITUTE. *A guide to the project management body of knowledge (PMBOK® guide)*. Newtown Square, Pennsylvania: Project Management Institute, 2013. ISBN 978-1-935589-67-9.

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Declaration

I declare that I have worked on my bachelor thesis titled "Project Management Techniques for Web-Based Projects" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the bachelor thesis, I declare that the thesis does not break any copyrights.

In Prague on date of submission

15.03.2024

MEET PATEL

Acknowledgement

Any individual task carried out cannot be completed without the help of different sources which directly or indirectly contribute to the achievement of the project.

I would like to thank my supervisor Ing. Jakub Konopásek, Ph.D. for his advice and support during my work on this thesis. He supported me with his unfailing support and advice during this study.

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Project Management Techniques for Web-Based Project

Abstract

Understanding the impact of employee attrition on project completion is crucial for effective project management, especially within the context of web-based projects managed by software companies or IT firms. This research aims to analyze how employee attrition affects project completion and, consequently, the strategies necessary to mitigate its adverse effects for enhanced project management. Employee attrition, indicating the rate at which employees depart from an organization, significantly influences project outcomes. The relationship between employee attrition and project completion is complex and multifaceted, influenced by several factors.

Key considerations include the loss of knowledge and expertise, disruptions in team dynamics, challenges in recruitment and training, difficulties in project handover, impacts on motivation and engagement, and project complexity and dependencies. These factors can lead to delays, reduced productivity, and hindered project progress. To counter these negative effects, organizations should focus on implementing effective talent retention strategies, such as competitive compensation, career development opportunities, positive work environments, and consistent feedback mechanisms. The structure of this research involves posing initial questions, providing comprehensive visualizations, and summarizing key insights from the analysis. Recommendations will be outlined based on these insights to aid organizations in reducing attrition rates and improving project management practices.

The study utilizes a dataset of 1470 observations, encompassing 35 features, with a focus on the 'Attrition' label indicating employee departure. Notably, the dataset exhibits an imbalance, with 84% of employees remaining in the organization and 16% leaving. Addressing this imbalance is critical for accurate analysis and interpretation. The distribution of labels illustrates the prevalence of employees choosing to stay compared to those opting to leave, prompting the need for careful consideration in predictive modelling approaches.

Keywords: Employee Attrition, Project Management, Web-Based Projects, Talent Retention Strategies, Team Dynamics, Recruitment Challenges, Project Complexity, Data Analysis, Imbalanced Dataset, Predictive Modelling

Techniky projektového řízení pro webové projekty

Abstraktní

Pochopení dopadu úbytku zaměstnanců na dokončení projektu je zásadní pro efektivní řízení projektu, zejména v kontextu webových projektů řízených softwarovými společnostmi nebo IT firmami. Tento výzkum si klade za cíl analyzovat, jak úbytek zaměstnanců ovlivňuje dokončení projektu a následně strategie nezbytné ke zmírnění jeho nepříznivých dopadů na lepší řízení projektu. Úbytek zaměstnanců, udávající míru, s jakou zaměstnanci odcházejí z organizace, významně ovlivňuje výsledky projektu. Vztah mezi úbytkem zaměstnanců a dokončením projektu je složitý a mnohostranný, ovlivněný několika faktory.

Mezi klíčové faktory patří ztráta znalostí a odbornosti, narušení dynamiky týmu, problémy při náboru a školení, potíže s předáváním projektů, dopady na motivaci a angažovanost a složitost projektu a závislosti. Tyto faktory mohou vést ke zpožděním, snížené produktivitě a brždění postupu projektu. Aby se organizace vypořádaly s těmito negativními vlivy, měly by se zaměřit na implementaci účinných strategií pro udržení talentů, jako je konkurenční odměňování, příležitosti pro rozvoj kariéry, pozitivní pracovní prostředí a konzistentní mechanismy zpětné vazby. Struktura tohoto výzkumu zahrnuje položení počátečních otázek, poskytování komplexních vizualizací a shrnutí klíčových poznatků z analýzy. Na základě těchto poznatků budou navržena doporučení, která pomohou organizacím snížit míru opotřebení a zlepšit postupy projektového řízení.

Studie využívá datový soubor 1470 pozorování, zahrnujících 35 prvků, se zaměřením na štítek 'Attrition' označující odchod zaměstnanců. Je pozoruhodné, že soubor dat vykazuje nerovnováhu, 84 % zaměstnanců zůstává v organizaci a 16 % odchází. Řešení této nerovnováhy je zásadní pro přesnou analýzu a interpretaci. Distribuce štítků ilustruje převahu zaměstnanců, kteří se rozhodnou zůstat, ve srovnání s těmi, kteří se rozhodli odejít, což vyvolává potřebu pečlivého zvážení v přístupech prediktivního modelování.

Klíčová slova: Úbytek zaměstnanců, Projektový management, Webové projekty, Strategie udržení talentů, Týmová dynamika, Náborové výzvy, Složitost projektu, Analýza dat, Nevyvážená datová sada, Prediktivní modelování

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1. INTRODUCTION

The discipline of project management is well-established, and it specifies in detail the tools and approaches that are required to define, plan, and carry out any project. These are all prerequisites for successful project management. However, while a great number of scholars have discussed the challenges associated with the management of projects in large companies (White and Fortune 2002; Bryde 2003), there has not been a great deal written about the management of projects in small and medium-sized enterprises (SMEs).

The previous empirical research on the implementation of project management in a variety of industry sectors and the success criteria and elements that are most frequently used are analyzed and discussed in this article.

In addition to this, the paper analyses the findings of a survey that was sent out to two hundred owners and managers of high-technology small and medium-sized businesses in Ireland. The purpose of the survey was to identify the general characteristics of projects that are carried out by SMEs, the challenges that they face, and the respondents' opinions on how SMEs can use project management to achieve greater efficiency and competitiveness.

According to Hallberg (1999), small and medium-sized businesses (SMEs) are essential to the economy because they serve as an engine of economic and social development. SMEs can range from dynamic, inventive, and growth-oriented businesses to traditional organizations that are content to remain static. (Floyd and McManus 2005), in their investigation of the growing significance of small enterprises in the European Union (EU), note out that increased prominence has been given to SMEs within the context of EU industrial policy. The European Competitiveness report from 2003 found that 99 percent of all activity in the EU was carried out by small and medium-sized businesses. The importance of small and medium-sized high-technology businesses to the Irish economy, as measured by their capacity to both generate employment and promote innovation (Warren and Hutchinson 2000) is the driving force behind the concentration on these types of businesses.

1.1 EMPLOYEE ATTRITION

Attrition occurs when employees depart for whatever reason, such as leaving voluntarily, being laid off, not coming back from a leave of absence, or passing away. Attrition occurs when employees leave for whatever cause and are not replaced for a long period of time.

Attrition can be broken down into two categories:

Employees are said to quit the company voluntarily when they make that decision. Whether or whether the departure was actually voluntary, all such situations are included here. You probably know the most about "true voluntary terminations," like quitting your job to take another one or to relocate across the country. Voluntary attrition can also include employees who leave for reasons other than economic ones, such as those who leave due to health concerns or because the work environment is unpleasant. Although there may be instances when the firm would prefer to replace the worker, it is always within its right to continue working with the individual in question.

Involuntary attrition occurs when a corporation lays off a worker without the worker's consent. A post can be eliminated as a result of a restructuring, layoffs, termination for cause (such as theft or fighting), poor performance, or voluntary resignation. (The third option might be considered a voluntary departure, but the corporation has the last say.) The position is either not refilled or eliminated without explanation. The most common form of attrition is the termination of positions due to lack of interest or performance, which is involuntary. In most cases of termination, the employer decides to fill the position after the fact.

1.2 RELATIONSHIP BETWEEN EMPLOYEE ATTRIBUTES AND PROJECT MANAGEMENT TECHNIQUES

The relationship between employee attributes and project management techniques is a critical factor in the success of any project. Effective project management requires a combination of structured methodologies and skilled individuals who possess the right attributes to execute the project tasks efficiently. In this context, employee attributes refer

to the unique characteristics, skills, and qualities that team members bring to the project, while project management techniques encompass the tools, methodologies, and processes

employed to plan, execute, and monitor the project. One of the key aspects of the relationship between employee attributes and project management techniques is the alignment of skills and competencies. Different projects require different skill sets, and project managers need to assess the capabilities of their team members and assign tasks accordingly. For instance, a project that involves extensive data analysis may require employees with strong analytical skills, while a creative project may demand individuals with a keen sense of innovation. By matching employee attributes with project requirements, project managers can ensure that the team has the necessary capabilities to deliver successful outcomes.

Effective communication and collaboration are also essential components of the relationship between employee attributes and project management techniques. Team members with strong communication skills facilitate the exchange of ideas, provide updates, and address challenges more efficiently. Project managers need to identify employees who possess excellent interpersonal skills, as they can effectively interact with stakeholders, manage conflicts, and build strong relationships within the team. Collaboration tools and techniques, such as regular team meetings, virtual communication platforms, and project management software, further enhance teamwork and productivity. Leadership attributes and decision-making skills also play a significant role in project management. Project managers need to possess leadership qualities and guide the team throughout the project lifecycle. Additionally, team members who exhibit leadership potential can contribute to the project's success by taking ownership, providing insights, and motivating their peers. By identifying individuals with leadership attributes, project managers can delegate responsibilities and empower their team members to make informed decisions.

Adaptability and flexibility are vital attributes in dealing with the dynamic nature of projects. Projects often encounter unexpected changes, uncertainties, and challenges. Employees who are adaptable and flexible can respond better to these situations. Their ability to embrace change, think creatively, and quickly adjust project plans or strategies is crucial for project success. Agile project management methodologies, such as Scrum or

Kanban, rely heavily on adaptability and flexibility. Team members who are open to learning, willing to take on new roles, and can handle evolving project requirements can significantly contribute to project outcomes.

Effective time management and organization are fundamental attributes that greatly impact project management. Efficient time management skills enable team members to prioritize tasks, set realistic deadlines, and ensure project milestones are achieved. Project managers can leverage techniques such as work breakdown structures, Gantt charts, and project scheduling tools to facilitate time management and improve overall project efficiency. Team members who are proficient in managing their time and resources effectively can help avoid delays and keep the project on track. Moreover, employee attributes also encompass technical competencies specific to the project's domain. For example, in an IT project, team members with programming skills, database expertise, or cybersecurity knowledge are crucial for the successful execution of tasks. In construction projects, employees with engineering or architectural backgrounds bring specialized knowledge to the table. Project managers need to identify and leverage these technical competencies within their teams to ensure that the project requirements are met.

The relationship between employee attributes and project management techniques is dynamic and interdependent. Project managers need to evaluate the strengths and weaknesses of their team members and assign tasks that align with their attributes. They should foster an environment that encourages open communication, collaboration, and continuous learning. By understanding and leveraging the diverse attributes of their employees, project managers can create high-performing teams that are capable of delivering successful project outcomes. It is worth noting that the relationship between employee attributes and project management techniques is not a one-size-fits-all approach. Each project is unique, and the required attributes may vary accordingly. Project managers should adapt their management style and techniques based on the specific project context and the attributes of the team members. They should also consider the development and training needs of their employees to enhance their skills and competencies.

In conclusion, the relationship between employee attributes and project management techniques is crucial for effective project execution. By assessing the individual strengths and attributes of team members, project managers can align them with the appropriate project management techniques, thus maximizing their potential and enhancing project outcomes. A well-balanced combination of employee attributes and project management techniques creates a strong foundation for efficient collaboration, effective decision-making and overall project success.

2. OBJECTIVES

The objectives of a study on project management techniques for web-based projects include:

1. Determine the average job satisfaction based on attrition status and investigate if any gender exhibits higher dissatisfaction levels compared to the other.
2. Calculate the average salary based on gender and evaluate the number of employees categorized by gender in each department.
3. Determine the average number of companies previously worked for each generation to investigate the claim that past generations tended to stay longer in one company.
4. Determine the average monthly income by department and examine if there are any notable differences between individuals who quit and those who didn't.
5. Assess the impact of distance from work on employee attrition. Investigate whether distance from work is a significant factor influencing employees' decision to quit the organization.

3. METHODOLOGY

Our objective is to analyze how Employers affect the project competition and their attrition is essential for project management. All web-based projects are completed by a Software company or a by an IT firm Employees in these firm can be diverse in various aspects and dimensions to counter that newly create certain objectives to understand what a company need for employees' attrition which lead to better project management.

3.1. DATA COLLECTION

In the context of data collection, we embark on gathering pertinent information from diverse sources. Employing libraries like Pandas for structured data and leveraging web scraping techniques through requests allows us to compile data from HR databases and other relevant repositories, creating a comprehensive dataset for subsequent analysis.

3.2. DATA PRE-PROCESSING

Data pre-processing is a critical phase in ensuring the dataset's cleanliness and suitability for analysis. Tasks such as handling missing values, converting data types, and addressing anomalies are efficiently managed using tools like Pandas. These operations lay the foundation for a refined dataset, prepared for in-depth exploration.

3.3. EXPLORATORY DATA ANALYSIS (EDA)

Exploratory Data Analysis (EDA) involves a profound exploration of the dataset to uncover patterns and relationships. Utilizing visualization tools like Matplotlib and Seaborn allows for the creation of insightful visual representations, such as histograms, box plots, and correlation matrices. These aids contribute to a deeper understanding of variable distributions and the identification of areas of significance within the dataset.

3.4. OBJECTIVE-SPECIFIC ANALYSIS

Tailoring analyses to specific objectives is crucial for extracting meaningful insights. Leveraging conditional queries and visualizations allows for objective-specific analyses. For instance, understanding the relationship between job satisfaction and attrition can be achieved through the use of visualization techniques and statistical tests.

3.5. SUMMARY OF FINDINGS

Post the meticulous analyses for each objective, summarizing the findings becomes imperative. Utilizing descriptive statistics and aggregation functions facilitates the distillation of key metrics. This step ensures that the results are not only comprehensible but also readily translatable into actionable insights for informed decision-making.

4. IMPACT ON WEB-BASED PROJECT MANAGEMENT

Resource Planning and Allocation: Insights into employee satisfaction, salary distributions, and work patterns aid in more accurate resource planning. Project managers can allocate resources effectively, ensuring that teams are well-balanced and motivated.

Risk Mitigation: Identifying patterns related to employee attrition allows project managers to proactively address potential risks. Strategies can be implemented to enhance job satisfaction, reduce turnover, and maintain project continuity.

Team Dynamics: Understanding team dynamics through exploratory data analysis enables project managers to foster a positive work environment. This, in turn, contributes to improved collaboration, morale, and overall team performance.

Informed Decision-making: The summarized findings provide project managers with actionable insights. Informed decision-making becomes more effective, leading to strategies that are aligned with the specific challenges and dynamics of web-based project management.

Continuous Improvement: By regularly analysing and summarizing findings, project managers can adopt a continuous improvement mindset. This involves adjusting management strategies based on evolving patterns, ensuring the ongoing success of web-based projects.

In essence, this methodology empowers project managers with data-driven insights, enabling them to navigate the complexities of web-based projects with greater precision, efficiency, and adaptability.

To mitigate the negative effects of employee attrition on project completion, organizations can focus on implementing effective talent retention strategies, such as competitive compensation, career development opportunities, a positive work environment, and regular feedback mechanisms. By prioritizing employee satisfaction and engagement, organizations can reduce attrition rates and promote smoother project execution.

4.1.STRUCTURE OF THE RESEARCH

This project will be structured in the following way:

- **Questions:** Questions will be asked previous to the visualization to make sure the visualizations shown in this project are insightful.
- **Summary:** After each section it will provide a summary to understand what we got from the visualizations.
- **Recommendations:** What recommendations could be given to the organization to reduce the **attrition rate**

4.2. COLLECTION OF DATA

The dataset used for this study consists of 1470 observations, with each observation representing a unique case, and it includes 35 features or variables. One fortunate aspect of this dataset is that there is no missing data, which simplifies the data analysis process. The dataset comprises two main data types: factors, which represent categorical variables, and integers, which represent numerical variables. The focus of this study is on the "Attrition" label in the dataset, which indicates whether an employee has left the organization. The objective is to understand the reasons behind employee attrition. Notably, the dataset is imbalanced, with the majority of cases (1237 observations, or 84%) indicating that employees did not leave the organization, while a smaller proportion (237 observations, or 16%) represents cases where employees did leave. This class imbalance implies that more individuals remain within the organization compared to those who actually leave, thus requiring specific considerations when analysing and interpreting the data.

4.3. DISTRIBUTION OF OUR LABELS

The distribution of our labels is a crucial aspect that warrants further examination in this study, particularly regarding the handling of an imbalanced dataset. Within our dataset, it is observed that 84% of employees chose not to quit the organization, whereas 16% did decide to leave. Recognizing the presence of an imbalanced dataset is essential as it guides us in determining the most appropriate approach for implementing our predictive model.

5. LITERATURE REVIEW

5.1.INTRODUCTION

Thamhain and Wilemon focuses on project management in the high-tech industry. The book explores the unique challenges faced by project managers in this industry, such as technological complexity, rapid innovation, and global collaboration. It covers essential topics such as project planning, scheduling, resource management, and cost control. The authors emphasize the importance of aligning project management practices with strategic goals and market dynamics. The book includes real-world case studies and examples specific to the high-tech sector.

Bresnen, Goussevskaia, and Swan explore the challenges and strategies involved in embedding new management knowledge within project-based organizations. The authors examine how project-based organizations integrate and disseminate knowledge across projects, focusing on the role of social networks, communities of practice, and learning mechanisms. The study highlights the importance of knowledge transfer, collaboration, and continuous learning in project-based settings. It offers insights into organizational learning processes and knowledge management practices that can enhance project performance and innovation.

Cohen, Lindvall, and Costa's article discusses the application of agile software development methodologies specifically in web-based projects. The authors examine the benefits, challenges, and best practices associated with using agile approaches in web development. They highlight the importance of iterative development, customer collaboration, and adaptive planning in the context of web-based projects. The article provides insights into agile practices such as Scrum and Extreme Programming (XP) and their application to web development, including requirements management, testing, and continuous integration. It offers practical recommendations for project teams seeking to adopt agile methodologies in web-based environments.

Dingsøyr et al. provide an overview of agile methodologies in software development and aim to explain the underlying principles and practices. The authors review the evolution of agile methodologies over a decade, highlighting the key characteristics, values, and

principles that define agile software development. They explore various agile methodologies, such as Scrum, Extreme Programming (XP), and Lean software development, discussing their strengths and limitations. The article contributes to a better understanding of the rationale behind agile methodologies and their impact on software development projects.

Hartman and Ashrafi's book "Agile project management: creating innovative products" provides a comprehensive guide to agile project management principles and practices. The authors explore the application of agile methodologies in managing projects that aim to create innovative products. The book covers topics such as agile planning, team collaboration, risk management, and project governance within an agile framework. It offers practical advice on adopting agile practices, addressing challenges, and leveraging agile project management techniques to deliver value-driven outcomes. The second edition incorporates recent developments and case studies, making it a valuable resource for project managers seeking to implement agile approaches.

Lechler, Cohen, and Goldschmidt explore the application of lean principles in web-based projects. The authors investigate the challenges and opportunities of implementing lean practices, such as waste reduction, continuous improvement, and value delivery, in the context of web development projects. They discuss the benefits of applying lean principles to enhance project efficiency, customer satisfaction, and product quality. The study offers practical insights and recommendations for project teams seeking to leverage lean approaches in web-based project environments.

Nerur, Mahapatra, and Mangalaraj's article addresses the challenges associated with migrating from traditional software development methodologies to agile methodologies. The authors identify key barriers, such as resistance to change, lack of management support, and organizational culture, that hinder the successful adoption of agile practices. They discuss the implications of these challenges and provide insights into strategies and practices that can facilitate a smooth transition to agile methodologies. The article highlights the importance of addressing organizational and cultural factors when implementing agile approaches.

Pich, Loch, and De Meyer's study focuses on the concepts of uncertainty, ambiguity, and complexity in project management. The authors discuss the challenges project managers face when dealing with these inherent characteristics of projects. They propose a framework that helps project managers navigate and cope with uncertainty, ambiguity, and complexity, suggesting strategies for effective project planning, decision-making, and risk management. The study offers insights into the dynamic nature of projects and provides guidance for managing complex and uncertain project environments.

Rico and Sayani's article explores project management practices specifically tailored to web-based software development. The authors discuss the unique challenges faced by project managers in this context, such as rapidly changing technologies, distributed teams, and evolving customer requirements. They provide insights into effective project management strategies, including agile approaches, for successful web-based software development projects. The article addresses project planning, team collaboration, risk management, and other critical aspects of managing web-based software development projects.

Sahay and Robey present a case study examining the implementation of Scrum, an agile project management framework, in a government context. The authors investigate the challenges and benefits of adopting agile practices in a traditionally bureaucratic and hierarchical environment. They explore the transformation process, the role of leadership, and the impact on project outcomes. The case study provides valuable insights into the application of agile project management principles in the government sector and offers recommendations for successful implementation.

Serrador and Pinto conduct a quantitative analysis to assess the success of agile projects. The authors compare the performance of agile projects against traditional project management approaches, examining various success criteria such as scope, schedule, cost, and customer satisfaction. Their analysis highlights the positive impact of agile practices on project success, demonstrating that agile projects tend to have higher success rates and customer satisfaction levels compared to non-agile projects. The study provides empirical evidence supporting the effectiveness of agile methodologies.

Shenhar and Dvir present the "diamond approach" to project management, focusing on successful growth and innovation. The authors propose a comprehensive framework that combines traditional project management practices with a strategic and innovative perspective. They introduce the concept of the "diamond," which represents four project dimensions: technology, customer expectations, project management processes, and the project's intended impact. The book provides insights into aligning project management with business strategy and fostering a culture of innovation within project teams.

Stol, Fitzgerald, and Russo's article explores agile project management practices specifically tailored to distributed teams. The authors discuss the challenges faced by distributed teams in implementing agile methodologies and propose strategies to overcome these challenges. They emphasize the importance of effective communication, collaboration tools, and adaptability in managing agile projects with geographically dispersed team members. The article offers practical recommendations for project managers and team members involved in distributed agile projects.

Tukel and Rom's study focuses on web-based project management systems in the context of construction projects. The authors investigate the benefits and challenges of using web-based systems for project management, such as document sharing, collaboration, and communication. They discuss the functionalities and features that such systems can offer to enhance project coordination, decision-making, and information exchange. The study provides insights into the potential advantages of web-based project management systems and their impact on construction project performance.

Vaagaasar's article focuses on project management practices specifically tailored to web design and development projects. The author examines the unique challenges and considerations in managing such projects, including requirements gathering, user experience design, development methodologies, and quality assurance. The study provides insights into effective project management strategies, tools, and techniques for successful web design and development projects. It offers recommendations for project managers and practitioners involved in this domain.

Williams highlights the need for new paradigms in managing complex projects. The author argues that traditional project management approaches may not be adequate for addressing the challenges posed by complex projects. He discusses the characteristics of complex projects, such as high uncertainty, interdependencies, and dynamic environments. The study advocates for adopting more flexible and adaptive project management practices that can better accommodate the complexity and uncertainty inherent in these projects.

Wohlin et al. provide insights into experimentation in the field of software engineering. The authors explore the use of empirical research methods and experiments to evaluate software engineering practices, techniques, and tools. They discuss the importance of experimentation in improving the understanding of software engineering phenomena, making informed decisions, and driving continuous improvement. The study offers guidance on conducting experiments and emphasizes the value of evidence-based practices in software engineering.

Wang, Xu (2011) This essay outlines the numerous changes that have occurred in the field of cloud computing over the course of the last few years. With the word cloud's important and, in fact, more enriching feature, the limitation of the project's expanding resource needs can be met. Without it, it would be very challenging to add computing speed and more resources, but with the pay-as-you-go model, it is very simple to increase and decrease the resources as and when the project requires them in the cloud infrastructure.

Kam Jugdev (2011) The most significant consequence of the software engineering project, as well as the aspects that are depending on the PMS software's results with reliability, are explained by the author in this paper as the major contributions to the many key factors that are governing project management. The majority of researchers today are helping PMS compete in order to increase output in shorter amounts of time.

Rada, Roy (2001) The author of this paper states that there are various models for managing software projects, and that most PMS software is managed using models. The models are chosen based on the requirements of the firm and the author's preference for particular businesses. PMS remedies According to their propensity for adopting Microsoft

standards and their contribution to real-world systems, the majority of corporations use the Microsoft SF to manage their ongoing and developing software products. The Capability Maturity Model, which is commonly utilized by American defense systems, is one of the other models employed by the defense system. It matters which organization is employing which model in accordance with their specifications and the results that organization has accepted from that model.

Robert Neumann (2011) The author of this paper outlines the main obstacles that a medium-sized software company faces when it transitions to Software Product Line Engineering (SPLE). The company's software engineering context is distinguished by a dual access to the market - product development for a more generalized, anonymous market as well as core customer driven product enhancement - and by the integration of software engineering into multi-disciplinary systems and solutions engineering.

Seven major obstacles to the migration are identified based on a description of the business, the software product that will be migrated to SPLE, and the objectives and history of the SPLE program. The management of requirements and variability, the integration of requirements traceability and variability management, legacy software and discipline- vs. software-specific modularization, integration with systems engineering, costing and pricing models, and project vs. product documentation are some of the issues that need to be addressed.

Koegel, Maximilian (2010) The author of this paper discusses software-based configuration management systems, emphasizing the significance of having sound models that link and correlate the various SDLC phases. Since the majority of graphical models are challenging to configure and manage, it's crucial to have an auto configuration model for graphical systems. Since they are designed for textual artifacts and ignore the graph structure of models, they should also support concurrency control. Since these systems' conflict detection methods demand a merge each time the same configuration item, in this example the same file, is modified, they frequently provide false positive results. In this study, we suggest operation-based conflict detection, which pinpoints conflicts on the model-changing activities themselves. In a multi-case analysis, we compare operation-

based conflict detection to file-based conflict detection and demonstrate that operation-based conflict detection produces fewer conflicts and hence calls for fewer merges.

6. PRACTICAL PART

6.1.DISTRIBUTION OF OUR LABELS

This is an important aspect that will be further discussed in this kernel and that is dealing with imbalanced dataset. 84% of employees did not quit the organization while 16% did leave the organization. Knowing that we are dealing with an imbalanced dataset will help us determine what will be the best approach to implement our predictive model (figure 1).

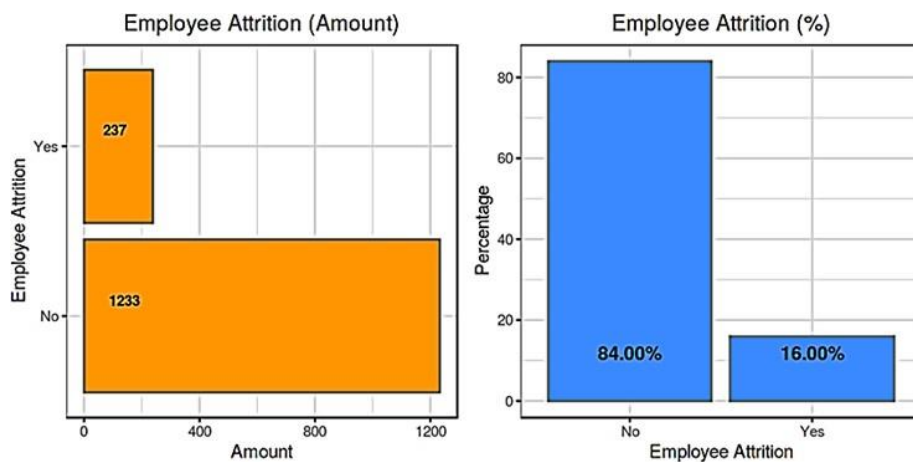


FIGURE 1: DISTRIBUTION OF OUR LABELS

6.1.1. GENDER ANALYSIS

This section will evaluate any potential differences between male and female employees inside the firm through a thorough investigation. In order to acquire a greater understanding of gender dynamics in the workplace, our attention goes beyond gender representation to examine a number of different factors, such as age, job satisfaction, and average wage. By looking at the organization's total gender distribution, we will first evaluate the workforce's makeup. We can find any potential gaps or imbalances in representation by comparing the number and percentage of male and female employees across various departments or job levels. We can also spot any changes in the gender composition of the organization by looking at patterns over time.

The age distribution of the male and female employees will then be examined separately. This analysis compares the average age of male and female employees in order to see if there are any age-related differences between the sexes. We can identify patterns or disparities that may offer insight on gender-related dynamics by looking at age groups within various employment levels or departments. We will now compare employee satisfaction levels between men and women. We will collect information on each individual's experiences with job satisfaction through surveys or interviews. We can determine if there are any differences in job satisfaction between genders by examining the responses. We will pay particular attention to areas where there are noticeable variances, including work-life balance, chances for career progression, or corporate culture.

6.1.2. AGE DISTRIBUTION BY GENDER

In our analysis, we examined the average age of individuals within the organization based on their gender. The average age for females was found to be 37.33, while for males, it was 36.65. This suggests a slight difference in age between the two genders, with females being slightly older on average. These findings provide insight into the age composition of the organization's workforce and can be useful for understanding any potential age-related dynamics or considerations within the workplace (Figure 2).

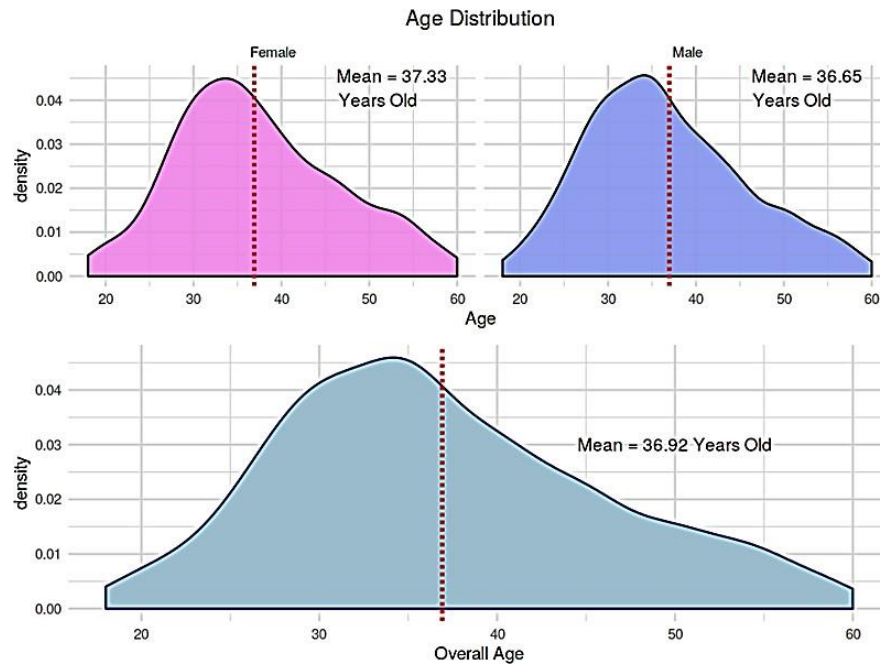


FIGURE 2: AGE DISTRIBUTION BY GENDER

6.1.3. DISTRIBUTION OF JOB SATISFACTION

An important factor to take into account in businesses is the distribution of work satisfaction among employees. It offers perceptions into the general satisfaction, involvement, and wellbeing of workers in their jobs and working settings. From low levels of job satisfaction to high levels of involvement and fulfilment, there is a vast range in the distribution of job satisfaction. Understanding the distribution of job satisfaction throughout an organization's workforce is crucial since it can directly affect employee engagement, output, and retention. Organizations can spot any patterns, trends, or differences between various departments, employment levels, or demographic groupings by examining the distribution of job satisfaction (figure 3). As a result of this understanding, tailored interventions and strategies can be developed to improve job satisfaction, address underlying problems, and promote an environment at work that is encouraging and supportive of employee satisfaction and well-being.

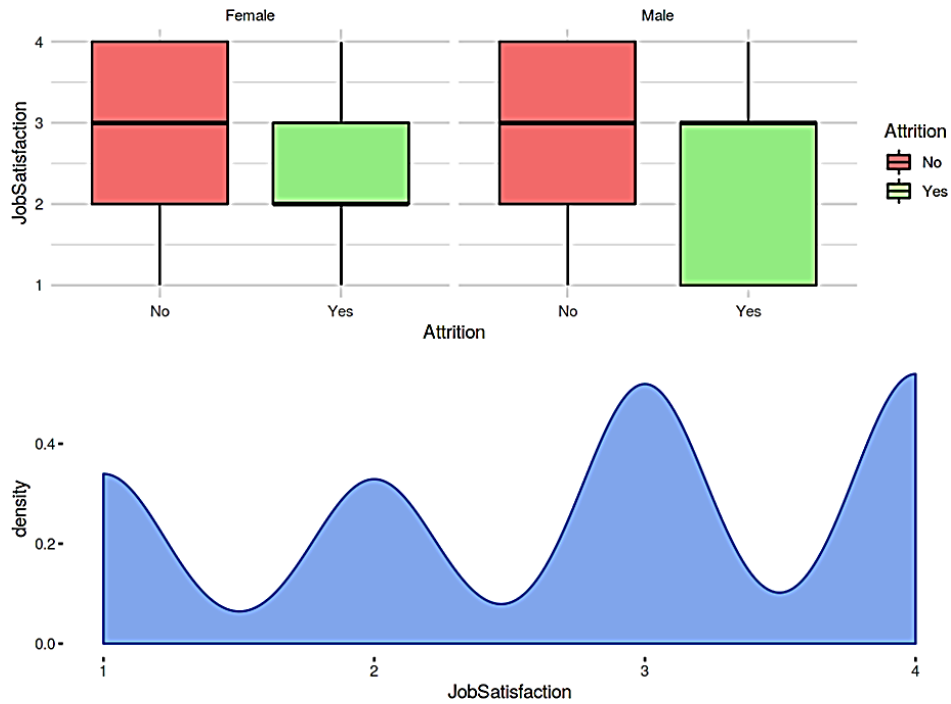


FIGURE 3: DISTRIBUTION OF JOB SATISFACTION

The distribution of monthly income among the organization's genders will be looked at in this section. In order to evaluate gender equality and guarantee fair compensation practices, it is essential to comprehend the differences in pay between male and female employees. We can spot any potential anomalies, patterns, or disparities by examining the distribution of monthly revenue (Figure 4). The spread of salaries or earnings throughout several tiers or categories is referred to as the distribution of monthly income. It sheds light on the range of pay between each gender group and aids in identifying whether there are any notable variations between male and female workers.

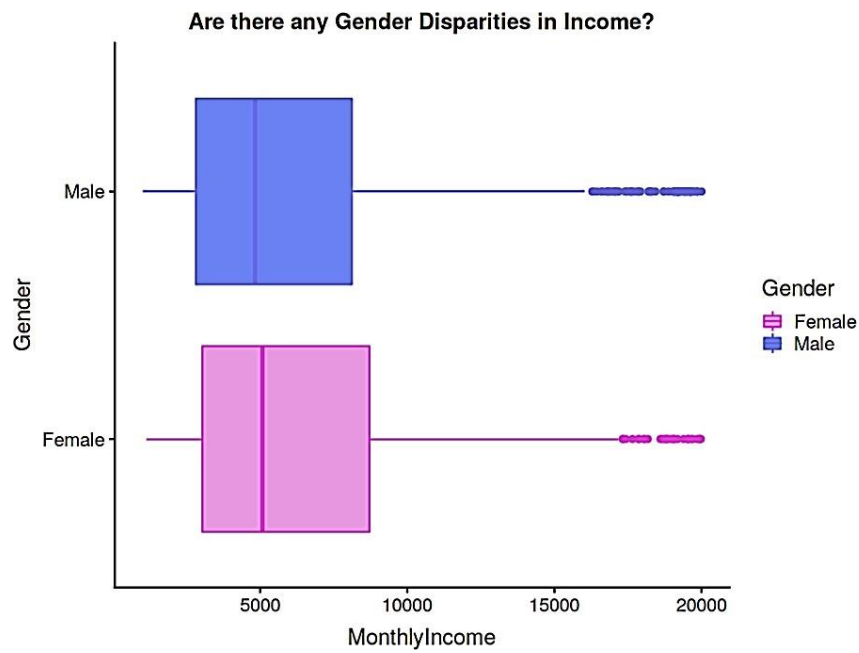


FIGURE 4: DISTRIBUTION OF MONTHLY INCOME

6.2. AVERAGE INCOME AND PRESENCE BY DEPARTMENT

First, we have a chart that breaks down monthly salaries by gender (entitled "Average Salary by Gender"). The graph presents a bar chart showing the median earnings of men and women. If there are pay gaps between men and women at your company, you can see them depicted here (figure 5). Gender-based salary differences, as suggested by the chart, may exist and should be further investigated and addressed to guarantee fair compensation for all employees.

The graph allows for a comparison of the gender distribution among departments, so illuminating any inequalities that may exist. The graphic shows that the number of male and female employees in each division is different, with certain divisions having a far larger proportion of female than male employees. To further promote gender equality and diversity, this study encourages researchers to dig deeper into the causes of departmental gender gaps.

The second chart, labeled "Number of Employees by Department," is a polar bar chart that graphically depicts the breakdown of workers by division. Each division is represented by

a different coloured bar, and the bar's height corresponds to the number of workers in that division. The graphic presents the data in a polar manner, highlighting the proportion of workers in each division. This illustration shows the interconnectedness of the many divisions inside the company. To establish a more even distribution of employees throughout different departments, the chart displays any discrepancies in the number of employees between departments, highlighting potential areas where recruitment, retention, or promotional efforts can be targeted.

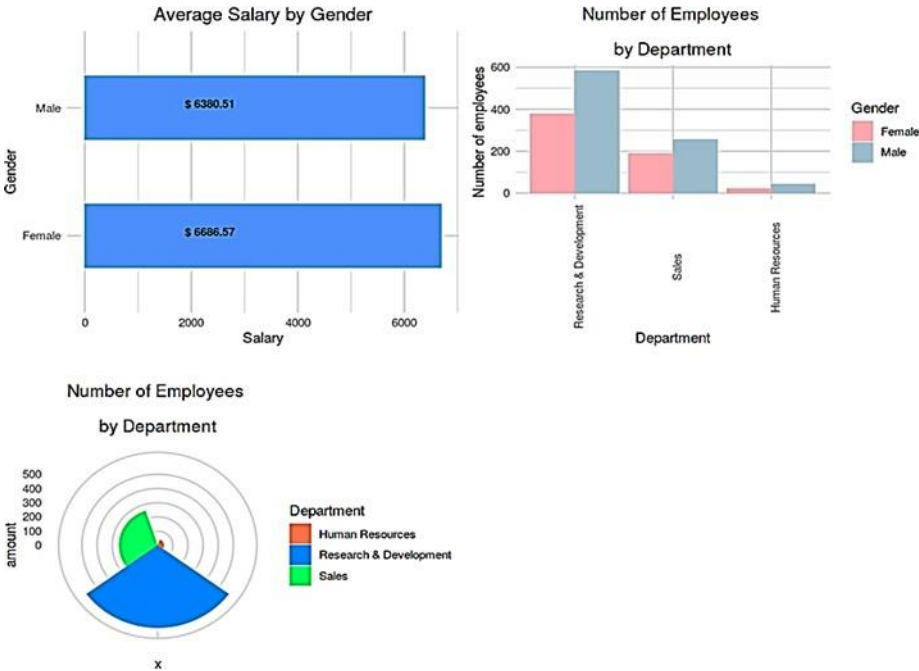


FIGURE 5: AVERAGE INCOMES AND PRESENCE BY DEPARTMENT

6.2.1. ANALYSIS BY GENERATION AND EDUCATION

It's generally agreed that each generation has its own set of quirks and habits that we hope to examine here. However, there is need for more investigation here, particularly with regards to the distinctions between the ages.

The analysis shows that employees who quit the organization exhibit interesting patterns based on their generational cohort and level of education. Among the boomers, it is observed that they have worked at a higher number of companies prior to their current organization. This suggests that boomers have experienced more job transitions throughout

their careers. On the other hand, millennials, being relatively young, have a lower number of previous company experiences. However, it is expected that this number will increase as they gain more years of professional experience. In terms of attrition by generation, it is found that millennials have the highest turnover rate, followed by boomers. This indicates that younger employees, specifically millennials, tend to seek alternative job opportunities more frequently. This could be attributed to their desire for greater job satisfaction and advancement opportunities. In contrast, boomers, who are nearing retirement age, also show a significant turnover rate, possibly due to their impending retirement plans. Furthermore, attrition by the level of education aligns with the previous findings. Employees with bachelor's degrees exhibit the highest attrition rate. This finding is consistent with the fact that millennials, who have the highest turnover rate, often hold bachelor's degrees. This suggests that the younger generation, with their higher educational qualifications, contributes to the overall turnover within the organization.

Overall, these insights highlight the different attrition trends among generations and their relationship with education levels. Understanding these patterns can help organizations devise appropriate strategies to manage and retain their workforce effectively, especially when it comes to addressing the needs and expectations of millennials and ensuring a smooth transition for retiring boomers.

6.2.2. UNDERSTANDING GENERATIONAL BEHAVIOUR

This study was designed with the goal of determining whether or not members of the millennial generation had a greater propensity to be choosy in their work choices when compared to members of older generations. In order to carry out the analysis, the dataset is first segmented into categorical variables according to age, with individuals being classified as either members of the Millennial Generation, Generation X, the Baby Boomer Generation, or the Silent Generation. Following this step, the distribution of the total number of firms worked is depicted using boxplots, with each generation and attrition status represented separately (Figure 6). This graphic makes it possible to do a comparative examination of the number of firms previously worked for by different generations as well as the patterns of employee turnover experienced by those companies.

The computation of the overall average number of firms worked is also included in the analysis. This includes calculations for all generations. In addition, the average number of firms worked for by each generation is determined, the employees are categorized according to their attrition status, and a segmented line graph is created to display the data. This graph illustrates the diverse patterns of behaviour that different generations exhibit in terms of their ability to switch jobs. The findings of the investigation offer some interesting insights into the employment preferences and levels of mobility experienced by people of different generations. The purpose of this study is to shed light on whether millennials, as a younger cohort, display a stronger inclination to shift jobs more frequently by evaluating the distribution of the number of firms worked and comparing it across generations. Specifically, the study will look at the number of companies worked by each age. This investigation helps contribute to a better understanding of the generational differences that exist in the workforce as well as the influence those differences have on rates of employee turnover (Figure 7).

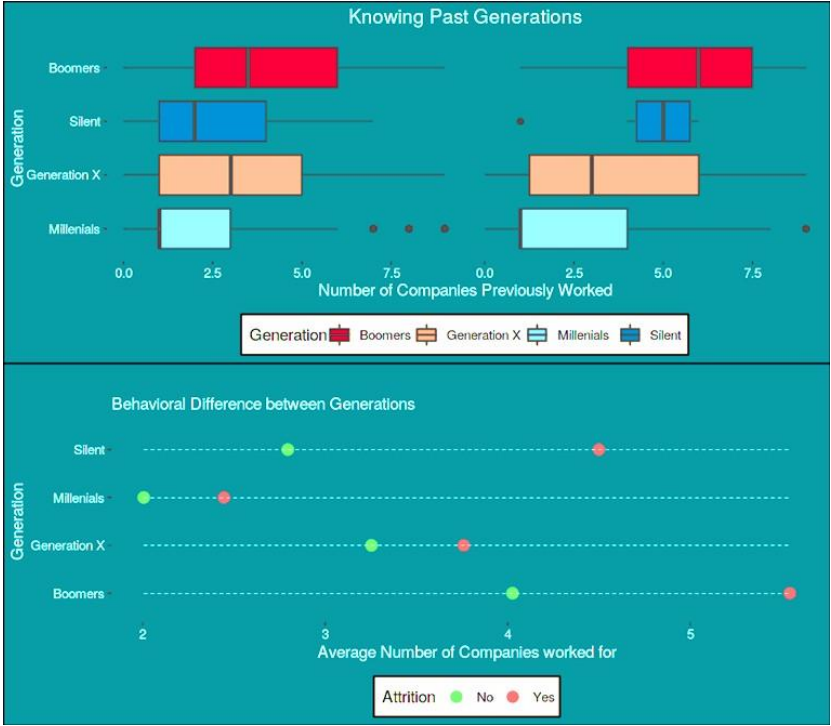


FIGURE 6: KNOWING PAST GENERATIONS

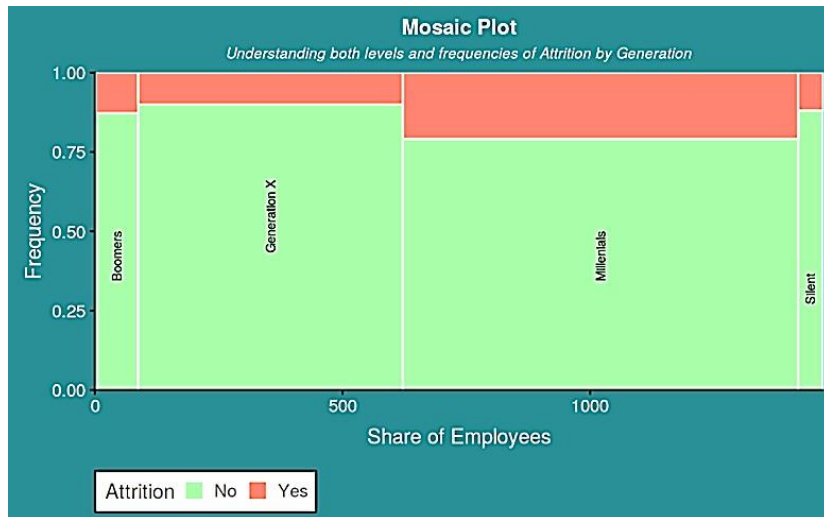


FIGURE 7: MOSAIC PLOT

6.2.3. ATTRITION BY EDUCATIONAL LEVEL

Bar plots, broken down according to education level and attrition status, are used to create a visual representation of the distribution of attrition. The data in this graphic can be used to make a comparison between the number of employees in each educational category who have remained with the firm and the number of employees who have departed. In order to evaluate whether or not there have been major losses of critical talent, the percentage of attrition that have occurred within each educational level have been analysed.

The findings of the investigation offer some interesting insights about attrition trends that can be broken down according to educational levels. The purpose of this study is to determine whether there are particular educational levels where the organization is experiencing a greater attrition rate, which may indicate the loss of valuable talent by looking at the proportions of attrition in each educational category. This will be done so that the study can determine whether or not there are such educational levels. This study can assist highlight areas of concern and provide insight into strategic actions to promote employee retention, particularly among employees with high levels of education.

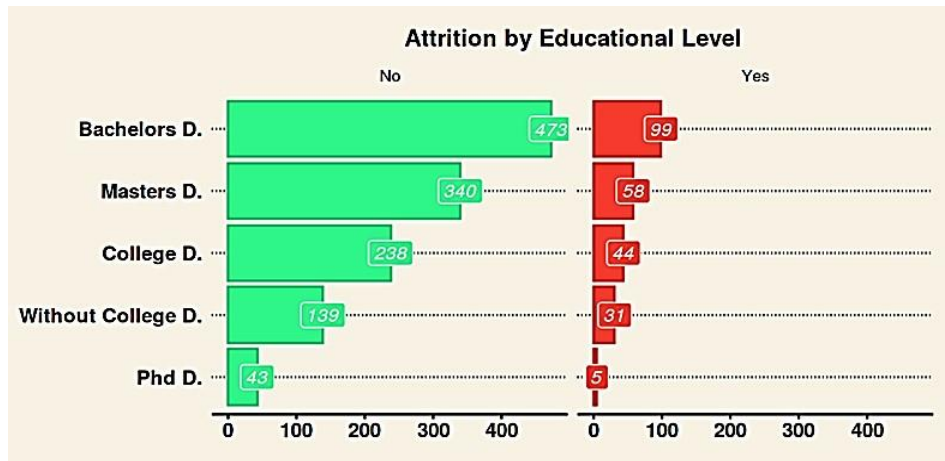


FIGURE 8: (1) ATTRITION BY EDUCATION LEVEL

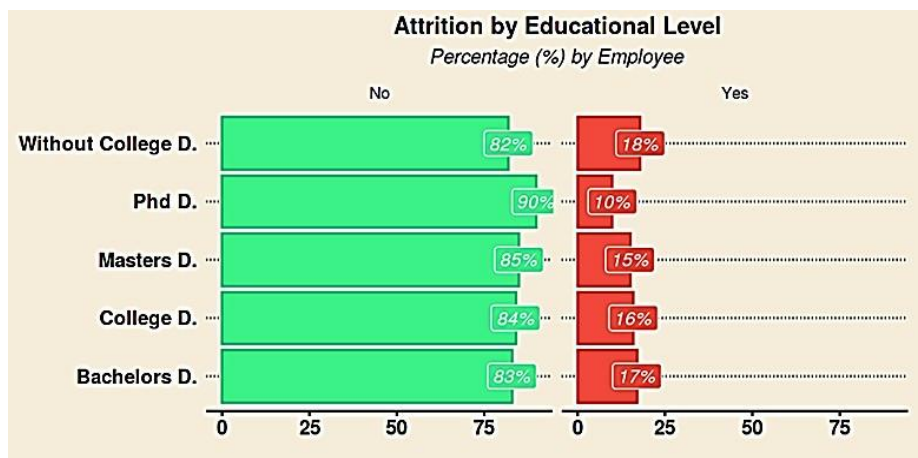


FIGURE 9: (2) ATTRITION BY EDUCATION LEVEL

6.2.4. THE IMPACT OF INCOME TOWARDS ATTRITION

I am curious about the level of significance each worker places on the revenue they receive from the company they work for. This is the place where we shall find out whether it is true that money truly does change everything.

- **Average Income by Department**

An investigation on the relationship between average income within departments and attrition rates was carried out so that it could be established whether or not pay was a significant factor in employees' decisions to leave the company. After compiling the data, we determined the median amount of money earned each month by personnel who left the

company as well as those who remained with the organization. The findings were shown graphically using a bar chart, with the x-axis denoting the departments, the y-axis indicating the average income, and the bars being coloured according to the attrition rate. The figure 10 was divided into two parts: one concerned with personnel who left the company, and the other with employees who remained in their positions. The data visualization showed the attrition status as well as the average salary for each department. The values were shown on top of the bars. This investigation sheds light on the potential impact that employees' incomes have on their decisions regarding whether or not to remain with the organization.

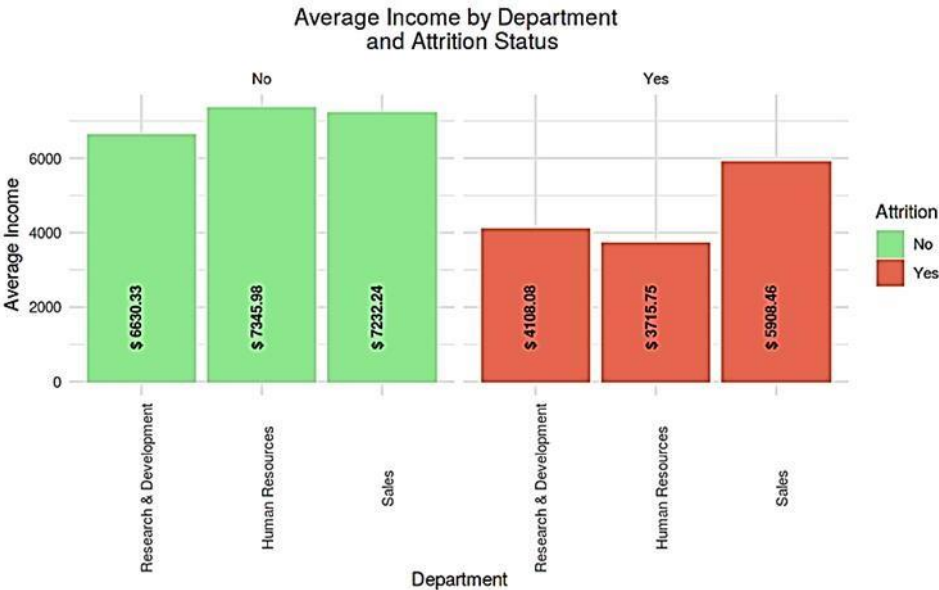


FIGURE 10: AVERAGE INCOME BY DEPARTMENT AND ATTRITION STATUS

6.2.5. DETERMINING SATISFACTION BY INCOME

The "Job Satisfaction" column was turned into a factor so that the relationship between job satisfaction and income could be studied. This was done in order to make it easier to sort the data in an ordered manner. The attrition rate was employed as a categorical variable in the research, and the median monthly salary was compared across the various degrees of job satisfaction. A scatter plot was created, with the x-axis indicating the levels of job satisfaction (reordered based on the median income), and the y-axis displaying the median income. The degrees of job satisfaction were reordered based on the median income. The

data points on the figure were coloured according on their attrition status, and vertical segments were added to illustrate the median income for each of the different levels of job satisfaction. The story included two different strands: one was for employees who left the company, and the other was for employees who stayed. The visualization offered some insights on whether or not an employee's income could be a contributing factor in their choice to leave the company, taking into consideration the level of job satisfaction they reported having. On the plot, the median income numbers were displayed, and the labels along the x-axis were flipped so that they could be read more easily. The purpose of this study, in its whole, was to investigate the possibility of a connection between income and employee satisfaction in terms of turnover.

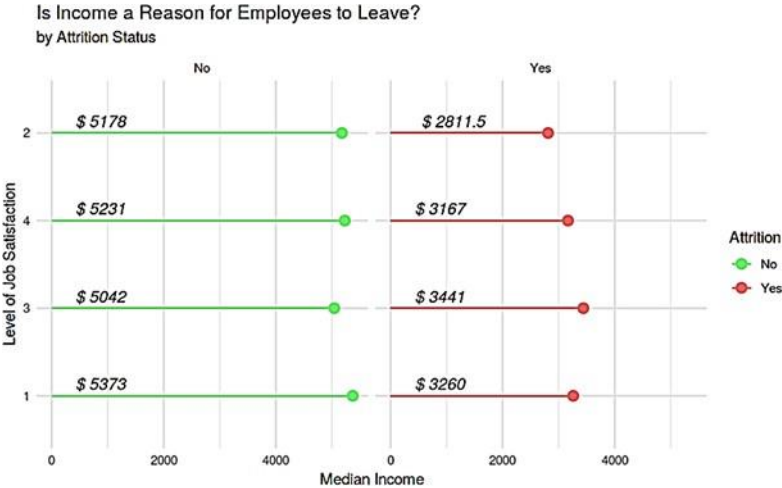


FIGURE 11: LEVEL OF JOB SATISFACTION

6.2.6. INCOME AND THE LEVEL OF ATTRITION

The relationship between the company's profits and the number of employees who left the organization was investigated through the use of an analysis. In the first example of data visualization, the effect of a percent wage increase on monthly income was analysed, and the data points were jittered and color-coded according to whether or not there was attrition. The goal of the scheme was to determine whether or not there were any distinct salary patterns or discrepancies between employees who left and those who remained. The second visualization looked at the correlation between an employee's performance rating and their monthly pay. Violin plots were used to illustrate how the distribution of income

differed across the various performance ratings, and the data was again segmented according to whether or not employees had left the company. These visualizations not only gave useful insights into the possible influence of income on attrition rates, but they also revealed any discrepancies in income that were based on performance rating. The purpose of the studies was to shed light on the impact that revenue plays in the organization's employee attrition rate by analysing the data.



FIGURE 12: INCOME AND IT'S ON ATTRITION

6.2.7. AVERAGE AND PERCENT DIFFERENCE OF DAILY RATES

This investigation concentrated on determining the average daily rates as well as the percent difference between those rates based on the level of attrition and job role status. The first visualization displayed the daily rates by employment role, with separate sides for cases involving attrition and those that did not involve attrition. The purpose of the plot was to present a summary of the daily rates for a variety of occupational roles and their connection to attrition. The analysis contrasted the average daily rates for situations where there was attrition and cases where there was no attrition within each job function in order to further investigate the difference in daily rates. After performing the calculation $(\text{No Attrition Daily} - \text{Attrition Daily}) / \text{No Attrition Daily}$, the result was rounded to two decimal places to get the percentage difference between the average daily rates. A bar chart

was used to illustrate the resulting percentage disparities, with the x-axis depicting the job responsibilities (reordered based on the % difference), and the y-axis displaying the percentage difference. The various work roles were each represented by a distinct color, which was added to each bar.

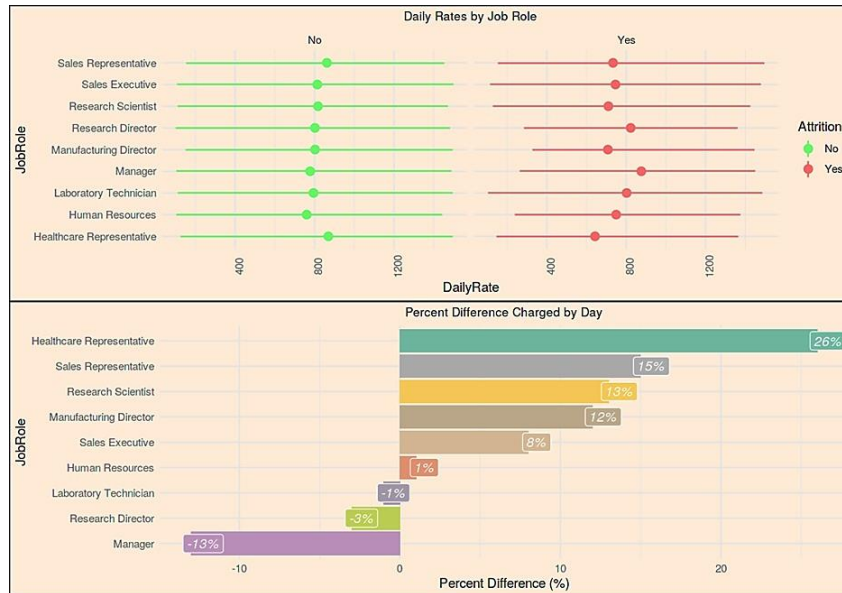


FIGURE 13: DAILY RATES BY JOB ROLE

6.2.8. LEVEL OF ATTRITION BY OVERTIME STATUS

The grouped data are comprised of two elements, namely "Attrition" and "Over Time," which together have a total of two levels and four variables. The first level of "Attrition" is "Yes," which represents employees who have left the organization, and the second level of "Attrition" is "No," which represents employees who have not left the organization. As with the other factors, the "Overtime" factor has two levels: "No," which indicates employees who did not work overtime, and "Yes," which represents employees who did work overtime. Both the "n" column, which indicates the total number of observations, and the "pct" column, which indicates the proportion of observations that fall into each category, are included in this table. There were 110 occurrences of employees who left the company and did not work overtime in this dataset. This accounts for 46% of the total observations. These individuals did not work extra hours. In addition, there were 127 cases of employees who left the company and worked overtime, which accounted for 54% of the

total observations. These cases comprised the total observations. This grouped data enables for additional research and examination of the link between these factors, as well as gives insights into the distribution of attrition and overtime across employees. These insights can be obtained by examining the data.

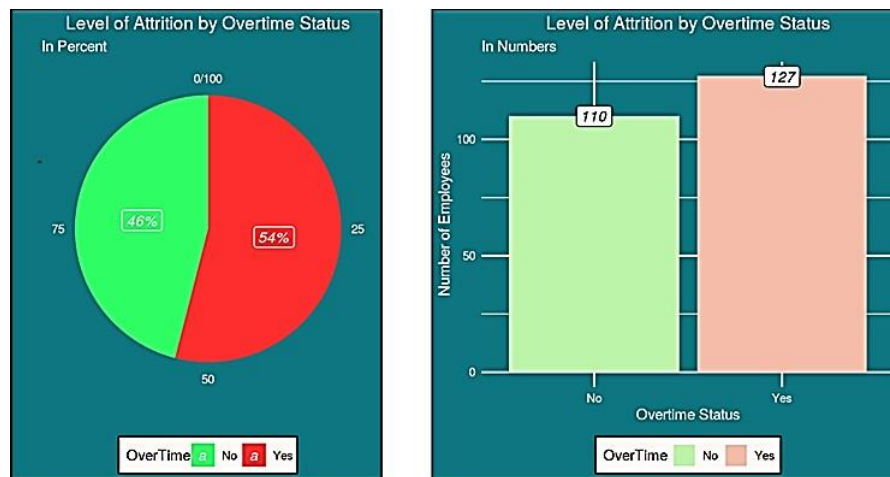


FIGURE 14: LEVEL OF ATTRITION BY OVERTIME STATUS

6.2.9. WORKING ENVIRONMENT

In this section, we will explore everything that is related to the working environment and the structure of the organization. There are a few essential inquiries that we need to pose to our self in order to acquire an in-depth comprehension of our corporation. To begin, we have to figure out how many people are working in each specific job category. This will help us identify any imbalances or areas of focus, which will offer us with useful insights about the distribution and composition of our personnel. The next thing we need to do is look into the average salary for each employment role.

We will be able to uncover any potential pay gaps and ensure that our organization maintains pay practices that are both fair and competitive if we conduct an analysis of the compensation levels for a variety of positions. The rate of attrition is a significant factor to take into consideration, and we ought to determine the percentage of attrition based on job position. This will assist us in understanding which employment roles have greater rates of turnover and which are more stable overall. We will be able to concentrate on putting

into action methods to promote employee retention and engagement if we first determine which job roles have the highest and lowest rates of employee turnover.

One further essential aspect that must be investigated is the level of contentment conveyed by the manager's status. We can evaluate if newly hired managers are having a beneficial impact on employee job satisfaction by doing an analysis of the average satisfaction rate based on the length of time employees have been working with their present manager. This understanding can direct our managerial actions and assist us in creating a work climate that is supportive and enjoyable to employees. We should assess the working environment according to the job roles. We are able to modify our efforts and policies to provide the best possible working environment for our employees if we first gain an awareness of the specific difficulties and qualities associated with each job type. This will contribute to increased job satisfaction, increased productivity, and overall success for the organization.

6.3. NUMBER OF EMPLOYEES BY JOB ROLE

The code produces a Tree Map representation that displays the number of employees organized according to their job roles. Following the selection of the "Job Role" column from the dataset, the analysis then groups the data according to the respective job roles. The "n ()" function is then utilized to perform the calculation necessary to determine the total number of employees occupying each job role. Using the "ggplot" function, a TreeMap plot is generated using the data that was collected as a result. The size of the tile in the TreeMap indicates the number of workers who fill that particular job position. The TreeMap is organized so that each tile represents a different job role. The "YlOrRd" color scheme is taken from the Brewer color system, and it was used to color-coded the job roles. Within each tile of the visualization are labels that reflect the appropriate job roles. There is no legend included in the design of the plot, but it does include a title and caption that explain what the visualization is meant to convey as well as how it should be interpreted. The TreeMap, taken as a whole, offers a graphical representation of the distribution of people among the many job roles that are available inside the firm.



FIGURE 15: MAJOR JOB ROLES INSIDE THE ORGANIZATION

The code segment generates two bar plots to analyse the median and mean salaries by job role within the organization. The data is first extracted from the dataset, specifically the "Job Role" and "Monthly Income" columns. It is then grouped by job role, and the median and mean salaries are calculated using the "median" and "mean" functions, respectively.

The first plot visualizes the median salaries for each job role, with the job roles reordered based on their median salary values. Similarly, the second plot displays the mean salaries for each job role. The job roles are reordered based on their mean salary values. The bars represent the mean income, and the colour used is "#BE81F7". The plot is titled "Salary by Job Role" and has a subtitle indicating that it represents the mean income. The x-axis represents the job roles, and the y-axis represents the mean income. The x-axis labels are also rotated for better readability.

Both plots are displayed side by side using the "plot grid" function, with the two plots arranged in two columns. This allows for a visual comparison of the median and mean salaries by job role. Overall, this analysis provides insights into the distribution of salaries across different job roles within the organization.

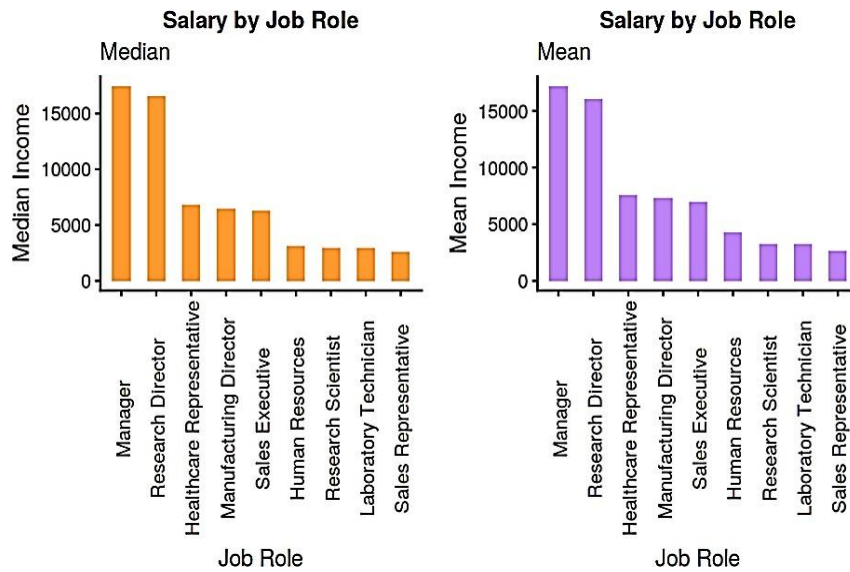


FIGURE 16: SALARY BY JOB ROLE

- **Attrition by Job Role**

The pyramid plot that displays the attrition rates broken down by job role is generated by the code. First, the "Job Role" and "Attrition" columns of the dataset are parsed out to obtain the required data. After that, the data are categorized according to employment position and attrition status, and the "n ()" function is used to get the total number of occurrences of each category. The information that is obtained is then subjected to additional processing in order to determine the percentage of each job role, and it is then arranged in ascending order according to the attrition percentage.

The "pyramid. Plot" function is what's responsible for creating the pyramid plot. The attrition rates for job roles that have a status of "No" attrition are indicated on the left side of the pyramid, whilst the attrition rates for job roles that have a status of "Yes" attrition are shown on the right side of the pyramid. The percentages are shown along the y-axis, and the job responsibilities are labeled according to where they fall on the chart. The attrition status of "No" uses a color palette that ranges from light green to dark green, whereas the attrition status of "Yes" uses a color palette that ranges from light red to dark red. The major labels "No" and "Yes" are printed at the top of each side of the pyramid,

and the plot is given the title "Attrition by Job Role." The proportions of the plot are changed so that it now has a width of ten and a height of six.

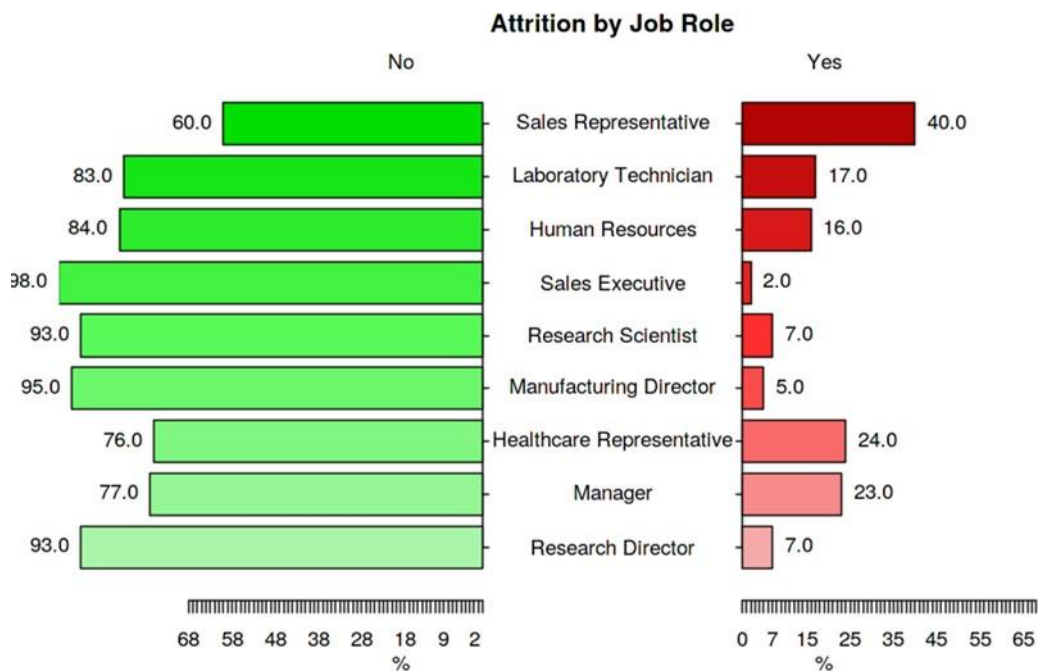


FIGURE 17: ATTRITION BY JOB ROLE

- **Current Managers and Average Satisfaction Score**

This visualization presents a breakdown of relationship satisfaction according to attrition status. The "Relationship Satisfaction" and "Attrition" columns of the dataset are selected by the application of a filter. The information is organized in groups according to the attrition rate. When creating a density plot, relationship satisfaction is plotted along the x-axis, density is plotted along the y-axis, and the fill color is determined by the attrition status. The plot can also be seen in different ways depending on the attrition state; for example, it can display separate panels for "Yes" and "No" attrition. The attrition categories are distinguished from one another through the plot by using a black-and-white motif and a legend located at the bottom.

The "plot grid" function is used to integrate the two visualizations so that they can be displayed next to one another. The figure that was produced as a consequence has two

rows, with the "relist" visualization located on the top row and the "rel. dist" visualization located on the bottom row. The dimensions of the plot are modified so that it now has a width of 8, and a height of 7.

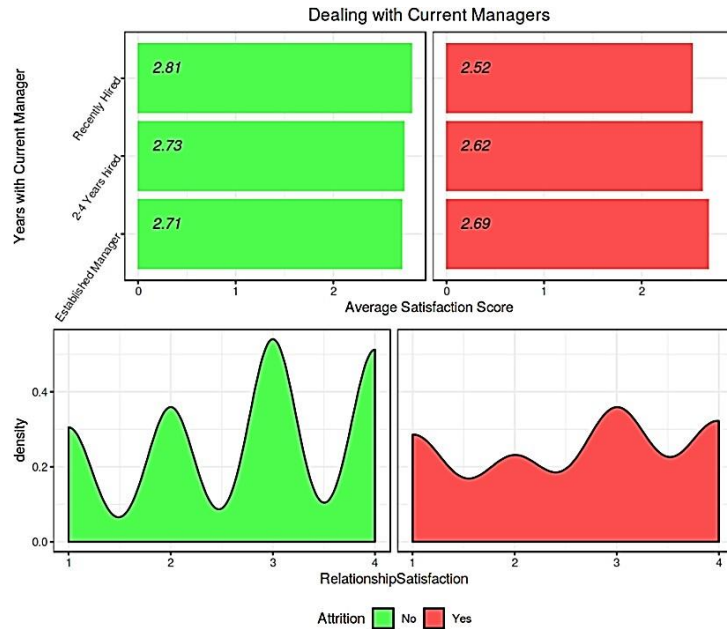


FIGURE 18: AVERAGE SATISFACTION SCORE

- **Average Environment Satisfaction**

The data includes variables such as environment satisfaction, job role, and attrition. The average environment satisfaction for different job roles and attrition levels is calculated. The visualization displays the average environment satisfaction on the y-axis and job positions on the x-axis. The lines represent the trend of environment satisfaction for each job role, with dashed lines indicating different attrition levels. The points on the graph represent the actual data points, with different colors representing attrition levels. The plot aims to provide insights into how job role changes and attrition impact environment satisfaction. It allows for a comparison between job roles and shows any variations in environment satisfaction based on attrition levels. The theme and color scheme are designed to enhance readability and understanding of the graph. Overall, this analysis provides a visual representation of the relationship between job role changes, attrition, and environment satisfaction.



FIGURE 19: AVERAGE ENVIRONMENT SATISFACTIONS

6.3.1. AN IN-DEPTH LOOK INTO ATTRITION

• Digging into Attrition

In this section, we will go as deep as we can into employees that quit to have a better understanding what were some of the reasons that employees decided to leave the organization.

The code applies a filter on the dataset such that it only contains information about employees who have been lost to attrition (that is, employees who have quit their jobs). The value of the variable "Work Life Balance" is being changed into the form of a factor variable.

The code then determines how many people work in each department based on how well they manage their time between work and their personal lives. This data is represented graphically by a bar chart, with the x-axis denoting varying degrees of work-life balance and the y-axis indicating the total number of employees. Because the chart is facet-wrapped by department, it is possible to do a comparison of the work-life balance in each individual department.

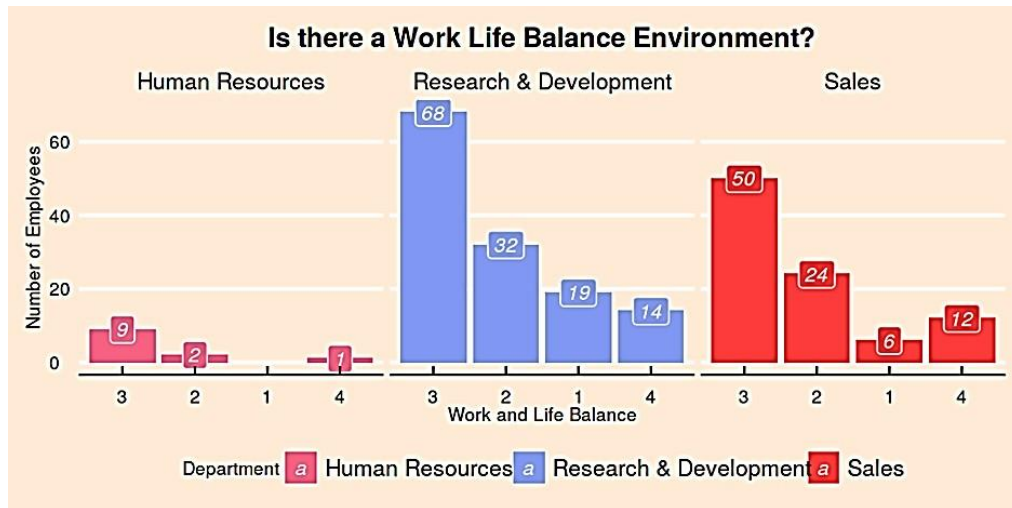


FIGURE 20: WORK LIFE BALANCE

6.3.2. OTHER FACTORS THAT COULD INFLUENCE ATTRITION

In this section we will analyse other external factors that could have a possible influence on individuals leaving the organization.

Some of the factors include:

- *Home Distance from Work*
- *Business Travel*

– *Home Distance from Work*

For the purpose of illustrating the distribution of distances from home for the various median distance categories, the visualization makes use of density plots. The distance away from home is shown along the x-axis, and the color of the fill indicates the distance category that falls in the middle. The graphic has been facet-wrapped by the median distance, which makes it possible to compare the distributions of the values found inside each category. The story follows a simple formula in order to put the emphasis on the different distribution patterns. In order to differentiate between the several categories of median distance and to highlight the areas that fall under the density curves, two color schemes have been utilized. In addition, there is a dashed line that runs vertically through

the plot at a distance of seven units to show the median value. A label bearing the text "Median = 7" is affixed to the median line in the form of an annotation.

This study's purpose is to investigate the distribution of employees' distances from home and their relationships to the median distance category among former workers at the organization. The plot offers a graphical depiction of these distributions, drawing attention to any differences that can be seen in relation to the median distance. The annotation draws further attention to the value in the middle and makes comprehending the plot easier.

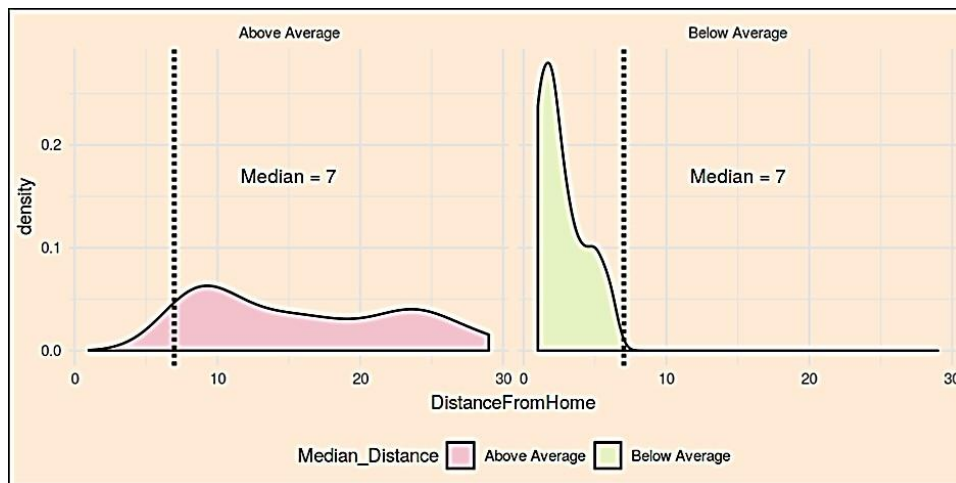


FIGURE 21: HOME DISTANCE FROM WORK

– *Business Travel*

The code that has been provided has two graphs that do an analysis of the distribution of employees' median distance from work in relation to attrition. The count of workers who fall into each of the many categories of median distance is the primary subject of the first plot, which has been given the designation p1. It then estimates the count for each category after grouping the data according to the median distance. The number of employees is depicted along the y-axis of the plot using a bar chart, while the median distance is shown along the x-axis of the plot. The bars have been arranged with the dodge position in mind in order to facilitate straightforward comparison. By utilizing a variety of color scales, the fill and color aesthetics have been calibrated to accurately depict the median distance categories. Each bar has a label that indicates the count that was added to it. Both plots

have a straightforward appearance in order to draw attention to the data. The legends have been taken out in order to make the visuals easier to understand. In order to differentiate between the many categories of median distance, color scales are utilized. The labels along the x-axis of both graphs read "Distance from Work Status" to provide some context for the data.

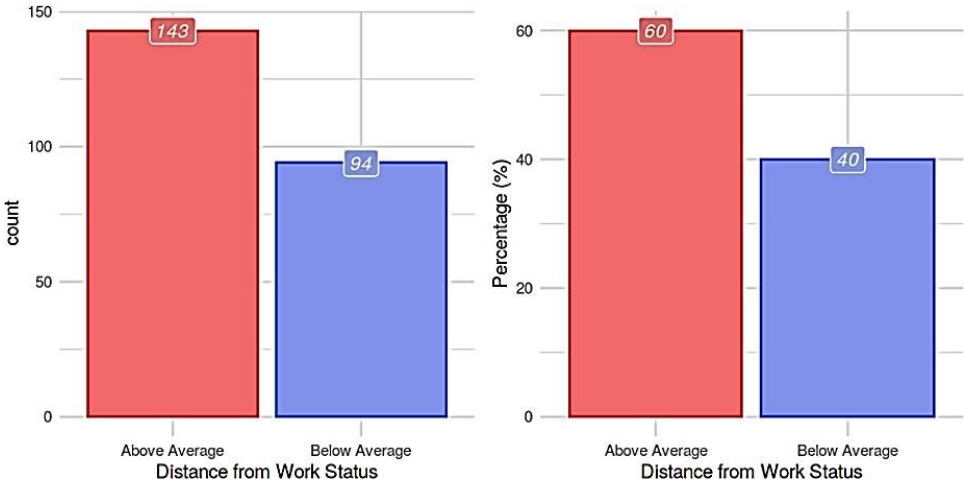


FIGURE 22: DISTANCES FROM WORK STATUS

7. RESULTS AND DISCUSSION

The findings that have been presented provide insights into the primary factors that lead employees to quit a firm, ranked according to the importance of various variables.

7.1.GENDER ANALYSIS

In examining the gender dynamics within the organization, several key findings emerged. The average age of female employees was 37.33, while for males it was slightly lower at 36.65, indicating similar age distributions. Job satisfaction levels were comparable between genders for individuals who remained with the organization. However, among those who left, females reported lower job satisfaction compared to males. Average salaries showed no significant difference, with males earning an average of 6380.51 and females earning 6686.57. While there was a higher number of males across all departments, females were more predominant in the Research and Development department. These insights provide valuable information for understanding gender dynamics within the organization

and can guide efforts towards promoting gender equality and enhancing employee satisfaction.

7.2.THE IMPACT OF INCOME TOWARDS ATTRITION

The data analysis reveals significant variations in revenue among different departments based on employee turnover levels. Furthermore, it indicates a correlation between lower job satisfaction and a greater wage disparity between employees who quit and those who remain in their previous positions. The findings demonstrate that the majority of employees in the attrition sample population had a monthly income of less than \$7,000 and experienced minimal pay growth (less than 15%) throughout their careers.

Interestingly, over 54% of employees who left the organization had worked overtime. This raises the question of whether work-related exhaustion played a role in their decision to leave. The results also highlight a notable difference in daily quit rates between employees who stayed in positions such as Health Care Representatives, Sales Representatives, and Research Scientists, compared to those who left. This suggests that financial factors, particularly for these specific roles, may have had a significant influence on the decision of the sample population to leave the organization.

The most important findings are as follows:

- **No Overtime:** Surprisingly, employees who don't have the opportunity to work overtime are more inclined to look for work elsewhere and depart the firm. This research shows that employees may feel underutilized in their existing roles or seek a higher wage than they are currently receiving. Retaining such personnel may be facilitated by addressing these issues through the provision of just compensation or the optimization of the distribution of workload.
- **Monthly Income:** It is reasonable to assume that income plays a substantial part in the decisions that employees make regarding whether or not to continue working for a business. It is possible for employees to look elsewhere for greater income prospects, which demonstrates why offering competitive compensation packages is so important for keeping talent.

- **Age:** The characteristic known as "Age" is also identified as a factor that contributes to the loss of employees. It is a legitimate assumption to make that employees who are getting close to the age of retirement are more likely to quit their jobs. When companies are aware of this tendency, they are better able to prepare for succession and put into action initiatives that will either help them keep experienced individuals or successfully transfer their expertise before those employees leave.

Management is able to take preventative steps to lower employee turnover rates by first determining the primary factors that contribute to employees' decisions to leave the firm. Improving employee retention within a company can be considerably aided by addressing concerns regarding the firm's overtime policy, providing salaries that are competitive in the industry, and putting in place plans to keep employees who are getting close to retirement age. Because of this understanding, businesses are now able to foster a more upbeat atmosphere in the workplace, boost levels of employee satisfaction, and encourage commitment over the long run.

The investigation yields valuable insights into various aspects of organizational jobs and their associated responsibilities. Firstly, the analysis reveals that Sales Representative and Research Scientist positions have the highest workforce representation within the organization. Secondly, in terms of compensation, the Manager and Research Director roles offer the highest average wages. This indicates the significance placed on these positions within the organization. Furthermore, the analysis uncovers notable patterns in employee turnover rates across different departments. The Sales Representatives, Healthcare Representatives, and Managers departments exhibit the highest levels of employee turnover, suggesting potential challenges or issues within these areas that contribute to attrition. Another noteworthy finding is the impact of managerial tenure on employee job satisfaction. Employees working with recently hired managers tend to report lower levels of job satisfaction compared to those working with managers who have been with the company for a longer duration. This highlights the importance of stable and experienced management in fostering employee satisfaction and engagement.

8. CONCLUSION

The culmination of this project management endeavour for web-based projects reveals a wealth of insights gleaned from the comprehensive results and discussions. The examination of gender dynamics within the organization exposes nuanced differences between male and female employees. Despite similar age distributions and average salaries, there exists a disparity in job satisfaction levels between genders among departing employees. This knowledge offers a foundation for initiatives promoting gender equality and bolstering employee contentment, imperative for a balanced and harmonious work environment.

Delving into the impact of income on attrition rates uncovers pivotal correlations. The data underscores the significance of wage disparities in driving attrition, with lower job satisfaction prevalent among those experiencing income discrepancies. Additionally, intriguing revelations regarding overtime work and its relationship with employee departures present the notion of work-related exhaustion as a potential factor influencing attrition decisions. Several crucial findings emerge, emphasizing pivotal factors influencing employee retention. The absence of overtime opportunities surprisingly contributes to increased attrition, highlighting the importance of ensuring employees feel appropriately utilized and fairly compensated. Moreover, the undeniable influence of income on employees' decisions stresses the significance of competitive compensation packages in retaining talent. Furthermore, the identification of age as a contributing factor suggests the need for succession planning and measures to retain experienced individuals nearing retirement.

These findings enable proactive measures by management to curtail turnover rates. Addressing concerns surrounding overtime policies and ensuring competitive salaries are pivotal steps toward fostering a positive workplace atmosphere and bolstering long-term commitment. Understanding the significance of retaining experienced talent before retirement age allows companies to strategize for knowledge transfer and succession planning. The investigation further uncovers essential organizational insights. Specific roles such as Sales Representatives and Research Scientists dominate the workforce, while

managerial and research director positions command the highest average wages, highlighting their importance within the organizational hierarchy. Notable patterns in turnover rates across departments, particularly in Sales Representatives, Healthcare Representatives, and Managers, underscore potential challenges in these areas requiring attention. Additionally, the impact of managerial tenure on employee satisfaction emphasizes the need for experienced and stable leadership to nurture employee contentment and engagement.

In conclusion, this project elucidates critical aspects affecting employee attrition, offering a roadmap for effective management strategies. It emphasizes the importance of fostering an equitable workplace, ensuring competitive compensation, and nurturing experienced talent, all crucial elements in cultivating a thriving and enduring organizational culture.

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