



REDEFINING WORK-LIFE BALANCE: THE TRANSFORMATIVE POWER OF  
VIRTUAL HR SHARED SERVICES IN THE IT INDUSTRY.

by

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Admissions Director

## **Dedication**

I sincerely dedicate this dissertation to my parents for showering their blessings on me and guiding me in every step of my life.

## **Acknowledgements**

I sincerely acknowledge and give my warmest thanks to my Supervisor Dr. Hemant Palivela for his continuous guidance and support during the period of my research work. His guidance and advice through all the research helped me accomplish this research work. Without his valuable and timely help with critical observations in my research, this research work would probably have not been completed in the present form.

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## ABSTRACT

# REDEFINING WORK-LIFE BALANCE: THE TRANSFORMATIVE POWER OF VIRTUAL HR SHARED SERVICES IN THE IT INDUSTRY

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2024

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This study investigates the impact of virtual HR shared services on work-life balance among IT professionals. We use methodologies such as descriptive studies, factor analysis, correlation analysis, multiple regression analysis, interaction effects study, and even structural modeling. The study seeks to investigate how these services affect employee satisfaction and retention rates, with a special emphasis on the IT sector. The findings imply an overall improvement in employee satisfaction and a reduction in churn rates as well as a major focus on virtual HR shared services. IT professionals exhibit the most improvements in both satisfaction and retention. However, the benefits were not uniform across all departments, highlighting need for tailored HR solutions.

Correlation and regression analyses demonstrated a negative relationship between employee satisfaction and churn rates. The deployment of virtual HR shared services, salary rate, age, and department all had a major impact on these results. The interaction effects study highlighted the complexity of factors influencing HR outcomes, demonstrating that the combined influence of many variables such as department and special project counts has a significant impact on employee satisfaction and attrition rates.

We also deliver few insights into the relationships between insights and HR outcomes. It confirmed that virtual HR shared services positively impact employee satisfaction, which in turn reduces churn rates.

These findings have various implications for human resource operations. Setting goals for virtual HR shared services for IT and related departments can improve employee retention and job satisfaction. Customizing HR solutions to match the specific demands of various departments is critical. Investing in user-friendly and effective HR solutions may speed up procedures and reduce administrative difficulties. Supporting remote work arrangements and continually improving HR services based on regular input from workers are also critical.

Future study should include follow-up research to investigate the long-term impact of virtual HR shared services. Cross-industry assessments and research into certain HR technology and employee well-being initiatives can provide broader perspectives and improve understanding in this area.

To summarize, virtual HR shared services dramatically improve work-life balance and lower attrition rates, particularly among IT workers. Organizations may promote a more pleased, engaged, and loyal staff by deploying adaptive, efficient, and specialized HR solutions, which helps them achieve their strategic goals and overall success.

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# CHAPTER I: INTRODUCTION

## **1.1 Introduction**

Human resources (HR) analytics has become an indispensable corporate function in recent years, radically modifying how businesses plan and run. In the contemporary world-labor market, opportunities are mined daily on a global scale based on how well a specific company functions. Success of a company is directly proportional to the Human resources management (HRM) of the company. If the organization hires people who end up being star performers, the company exceeds expectations both financially as well as on cultural scales. In order to add pronounced value to Business analytics via HRM, the hiring committee needs to be innovative and market relevant at all times.

With the year 2020 rolling in, Covid-19 pandemic changed the world of technology as well as the world for everyone forever. As the industry propels forward, so does the complexity and scope of managing human resources within it. Traditional HR models, once considered sufficient, are increasingly seen as inadequate for addressing the unique challenges posed by the IT sector. This inadequacy has led to the emergence and adoption of more agile and scalable HR management systems, among which virtual shared services stand out as a particularly transformative approach. Virtual HR shared services are an alteration in strategy of how human resources can be managed. But not just with a technology fix, also a permanent balanced one. These shared services are designed to simplify administrative procedures by centralizing and virtualizing different HR operations. This will free up time and resources for the HR department as well as the employees they support.

By automating routine tasks and offering virtual platforms for employee engagement, training, and support, these services can potentially alleviate some of the pressures that contribute to work-life imbalance. However, the relationship between virtual HR shared services and work-life balance is intricate, influenced by a range of factors from organizational culture to individual employee needs and preferences.

#### **A. HR analytics amidst Business value:**

In the Information Technology (IT) industry, the work-life balance is in a state of fluctuation. It is continually being reshaped by a myriad of factors. The industry in oneself is a mutilated innovation, marked by an unrelenting pace that leaves little room for being still. This dynamism is not merely confined to the technologies being developed but extends to the very nature of work and the expectations placed upon the workforce. Professionals in this sector often find themselves at the intersection of demanding project timelines, the need for perpetual skill upgradation, and the challenge of maintaining a healthy work-life equilibrium.

But with the change in workforce due to the pandemic, the HRM systems all over have changed the Work from Home force caused a lot of adjustments, some good and some not so-good. The world of morning coffees and meetings turned into working from home and at ease with precautionary measures in place. Hiring parameters changed and were to be set in an achievable as well as in-sync with market expectations. The practice of gathering and evaluating HR data with the goal of boosting worker efficiency inside a business is known as HR analytics. Additionally, other acronyms for the process include workforce analytics, people analytics, and talent acquisition. With the use of this data analysis technique, HR consistently gathers data and correlates it with organizational and HR goals.

By doing this, quantifiable proof of how HR efforts support the objectives and strategies of the company is provided.

Consider a cupcakery called "Food ABC" that struggles to retain its cooks and waitstaff for longer than a few months at a time. Such a high staff turnover rate can negatively impact food quality and service, which will ultimately lower customer satisfaction and damage the restaurant's earnings and reputation. FoodABC can determine the primary causes of employee attrition, such as poor pay, excessive hours, or a more work hours/less work-life balance, by utilizing HR analytics. With this data, management may address targeted improvements, such as raising wages, modifying the hours employees work, or fostering a more motivating setting at work. The cuisine gets systematically better, the customer service gets better, and each member of the staff gets more skilled at what they enjoy as the restaurant continues to hire more people. This ends up resulting in a greater number of happy clients, more repeat clients, and more revenues. Furthermore, the restaurant can plan for subsequent growth or enhancements when it has a solid staff. A more prosperous firm is the result of investing in employees to acquire knowledge about their needs and issues. The business can boost production and income by lowering turnover.

HR, which was once considered as an administrative trade fair solely focused on hiring, payroll, and compliance, has altered as a result of technological analytics especially post the pandemic. HR was able to develop as a major ally with an active role in many important business decisions thanks to this paradigm change. The potential of HR analytics to generate significant business value is directly related to its growing importance. HR departments can now successfully forecast trends, make informed decisions, and gain

insightful knowledge that supports and advances the primary business goals by utilizing data. Because HR services are flexible, they can go beyond conventional bounds and address issues like employee engagement, workplace optimization, corporate conduct, and talent management. Incorporating HR information into organizational initiatives also increases the flexibility and dynamic nature of the management structure.

It makes it possible for HR policies and practices to be adjusted on a regular basis in response to shifting business conditions and tactics. Because the aforementioned initiatives directly contribute to company success, companies may, for example, prioritize efforts to enhance work conditions if data indicates a high association between staff engagement and customer satisfaction levels.

## **B. Rise of Employee Analytics due to the pandemic**

Breakdown of Employer's ramifications on Professional Advancement:

The research team's analysis provides a thorough look into how various employers act as launching pads for career advancement. It is based on data pertaining to 3 million employees from Fortune 250 companies between 2019 and 2022, as well as over 40 million career postings. This inquiry is important because it sheds light on the differing levels of support that businesses provide for the professional development of their employees.

This study is released in 2024, where the employers are under severe scrutiny for how they treat their workforce. This is based on the stagnant labor market, a trend that is expected to worsen. Investors and government agencies are making companies liable for their labor policies. This reflects the growing consensus that treating people fairly is not just the morally correct thing to do, but also a necessary condition for a business to succeed.

Employers should take note of this: investing in quality career development programs is not only beneficial to employees but also a need. It is important as it can help them attract and retain top talent in a highly competitive market. CEOs are advised to assess their staff development programs, paying particular attention to accessibility and diversity. This will contribute to ensuring that every worker, irrespective of educational background, has an equal opportunity to develop and succeed in the market.

When businesses begins to think about HR analytics, the following advantages should be expected:

- Optimized hiring process
- Strategic workplace planning for growth
- Employee retention graphs
- Overall profitability

The field of human resource management has seen significant changes in recent years because of HR analytics, which has transformed raw data into a treasure trove of insights that guide strategic decision-making. The journey of HR analytics is profound and intriguing enabling a comprehensive glimpse at the inner workings of the workforce. Let's examine this analytical powerhouse's workings and how they significantly impact current HR procedures pre and post covid-19.

## **Data Collection:**

The very first step of this task would be Data Collection. Some of the most common data are as follows:

1. Employee details: Skills, qualifications, certifications, hobbies, languages spoken, etc.
2. Performance attributes like salary range, career switch history, skills adaptability, work hour adjustments, etc.
3. Salary and promotion histories
4. Demographic data: including age, gender, and cultural background to foster diversity and inclusion.
5. On-boarding and Training: Evaluating the effectiveness of initial training programs.
6. Engagement and Retention: Measuring how engaged employees are and how long they stay with the company.
7. Turnover and Absenteeism

The data for this HR-related dataset was generated through a combination of synthetic data creation, insights from real-world HR structures, and guidance from publicly available sources such as Kaggle and GitHub. Kaggle provided inspiration for the dataset's structure, particularly with regards to including features like employee demographics, performance metrics, and salary history, which are commonly found in similar HR datasets hosted on the platform. Additionally, GitHub repositories on HR analytics contributed to the design of the dataset, ensuring it aligns with industry standards in terms of features and diversity of attributes. Furthermore, inputs from HR surveys and industry research were incorporated to reflect realistic trends in employee engagement, turnover, and retention. While the

dataset itself remains fictional and tailored for educational purposes, these sources helped ensure its realism and applicability for teaching data analysis, visualization, and predictive modeling in HR.

## **Tools and Techniques Used in Data Analysis**

### **Tools**

- **Tableau Desktop:** Tableau is the primary tool used in this course for data visualization. It allows students to build dashboards, visual reports, and perform exploratory data analysis (EDA). It is ideal for users with little programming background, as it is highly user-friendly.
- **Excel:** As a foundational tool for HR professionals, Excel is used for preliminary data cleaning, basic pivot tables, and initial data analysis.
- **Python/R (Optional):** While not mandatory for students, Python and R can be used for more advanced predictive modeling, machine learning, and statistical analysis. Libraries like Pandas, Scikit-learn, and Matplotlib are useful for these purposes.

### **Techniques**

- **Data Cleaning:** Before analysis, missing values, outliers, and inconsistent data types are addressed using Python's Pandas library or Excel.
- **Exploratory Data Analysis (EDA):** EDA helps in understanding the overall structure of the dataset, identifying trends, and spotting anomalies.
- **Data Visualization:** Tableau is used to create visual representations like bar charts, scatter plots, and heat maps to help interpret the data.
- **Predictive Modeling:** Regression analysis and classification models can be applied using Python/R to predict outcomes such as turnover, performance, or engagement levels based on the dataset.



- **Employee Segmentation:** Clustering techniques are used to group employees based on factors like performance, engagement, and salary to help HR professionals make data-driven decisions.

### **Sample Size**

For this educational dataset, the number of employee records ranges from 5000 to 10000 depending on the version, covering a wide variety of roles, departments, and personal attributes. This sample size is appropriate for teaching students how to analyze a large enough dataset that reflects real-world HR challenges while ensuring computational efficiency during exercises.

### **The Analytics Map:**

1. Data must initially be delicately gathered, laying the groundwork for all subsequent research.
2. This data is regularly analyzed and compared to historical benchmarks to detect patterns.
3. Analysis: At this stage, the data is thoroughly analyzed to obtain useful insights.
4. Application: The third, critical stage is to use these insights to create educated, strategic decisions for the organization.

### **C. Elevating Analysis Methods using AI**

With the wake of the COVID-19 pandemic, and the increasing need of incorporating ever-expanding data sources due to changes in workforce, internal digital patterns, tools and technology available online and offline, remote working conditions

specific to areas and people, a new reliance on data analytics was found. With rapid changes through which we analyze pre and post-COVID shifts in employee needs, accommodations, performance management shift as well as new personalized compensation strategies the HRM was reimagined and reintegrated on a new level. By elevating analysis methods with AI, researchers can navigate the complexities of HR transformations in the post-COVID era, driving informed decision-making and fostering resilient, future-ready organizations.

Some of the indexed dimensions are explained below:

### **Index Dimensions:**

1. Promotions within the company: People accomplish great work when given the right reinforcements and recognitions.
2. Stability : assessing the company's long-term job security measures
3. Quality trajectory of growth: The quality of work expected by the clients is directly proportional to the quality of efforts put into it. In early stages of career the skills and experiences help determine the long term trajectory of one's career. Determining if the employee continues on the same tech stack or plans to change with respect to the market demands is also crucial paramet
4. Social and Economic implications: Engagement in project and off-project activities, socially acceptable behavior as well as standard work rules plan an important role in determining the retention index of individual employees. Joining a lower-tier company doesn't necessarily doom one to poor career outcomes, but it markedly reduces the likelihood of achieving

optimal career success. This disparity highlights the need for more informed career decisions among job seekers and a more strategic approach to workforce development among employers.

### **Types of HR Analytics:**

- **Descriptive Analytics:** This is our beginning point, where we evaluate what has occurred. For example, analyzing the annual turnover rate allows us to view the big picture of staff retention.
- **Diagnostic Analytics: Why Do Things Happen?** This means going deeper into the data to find the reasons behind trends, such the reason why a particular department might have more absenteeism.
- **Predictive Analytics: What Could Happen?** The method projects the future by analyzing historical data and making assumptions about which employees might leave the company given current patterns.
- **Prescriptive Analytics?** Prescriptive analytics, suggests taking particular action based on forecasts, including providing extra assistance to staff members who might need it.

## **D. Limitations, Delimitations, and Assumptions**

### **Limitations**

- **Geographical Scope:** The study will focus on IT companies within the United States. This will limit the generalizability of the findings to other geographical

locations, however it can be applied to all overworld usecases with more data collection strategies.

- **Sample Size:** The study's statistical power may be impacted by a small sample size for surveys and interviews due to time and resource limitations.
- **Self-Reported Data:** The study uses self-reported metrics for work-life balance. This can be skewed by error or social desirability bias.
- **Cross-Sectional Design:** This type of study collects data at a single moment in time, which makes it challenging to determine causal correlations.
- **Technological Changes:** The IT industry's rapid advancements in technology may surpass the research's pace, which could eventually render certain conclusions less applicable.

### **Delimitations**

- **Industry Focus:** The study is delimited to the IT industry, excluding other sectors where virtual HR shared services may also be applicable.
- **Virtual HR Services:** The research will specifically focus on virtual HR shared services, excluding other forms of HR technology or practices.
- **Work-Life Balance Metrics:** The study will use specific metrics to measure work-life balance, such as job satisfaction, stress levels, and turnover intentions, thereby excluding other potential indicators.
- **Organizational Size:** The study will focus on medium to large IT companies that have implemented virtual HR shared services for at least one year, excluding startups and small enterprises.

## **Assumptions**

- **Honest Reporting:** The study assumes that participants will provide honest and accurate responses in surveys and interviews.
- **Stable Environment:** It is assumed that there will be no significant organizational changes (e.g., mergers, layoffs) in the participating companies during the period of the study that could affect work-life balance.
- **Validity of Instruments:** The study assumes that the survey and interview questions are valid measures of the constructs they are intended to assess.
- **General HR Practices:** The study assumes that the virtual HR shared services implemented in the participating companies are representative of general practices in the IT industry.
- **Employee Engagement:** The study assumes that employees are sufficiently engaged in their work and organizational culture to provide meaningful insights into work-life balance.

## **E. Brokerage and Risk management:**

Many types of risks can occur in a company. They need to be identified, assessed in the right way and mitigated if required to minimize the effect of damage. Risks can affect the profit of businesses, human operations as well as business objectives. In HR domain, risks can range from non-compliance issues to employee behaviour issues, customer dissatisfaction, poor employee management, less work life balance, etc. In order to predict risks in advance, proactive participation of employees and customers are required. Machine learning models come in help here, for example an ML model can be equipped to see patterns in trends, employee behaviour, performance of a product, potential of a deal, strategic investments as well as market wide opportunities.

1. Understanding how risk works in Human Resources : Transforming raw data into insights with various data collection methods can help companies derive underlying factors for employee behaviour and satisfaction.
2. Mitigating Risks via Machine learning models : Predictive modeling, employee sentiment analysis, workforce planning are examples of the same. AI, ML and DL algorithms combine help to predict which employees may leave the company in the upcoming months. Thus an organization can have potential substitutes as well as cost saving or retention focused initiatives. Sentiment analysis can be employee feedback or surveys by using text analytics and natural language processing. They help address customer concerns as well as attrition or disengagement can be improved. Workforce can then finally make informed decisions based on training candidates for specific skills or talent hiring in specific domains. This helps maintain stability as well as makes the company market ready.
3. Compliance rules and Regulations for HR : Labor laws and regulations are legal bindings between employee and company or customer and company or even consumer to business. As the world of web gets complex, this part of companies is becoming more and more complex to deal with as things are being more subjective and less standard.

This being said, there are a few major government employment practices and regulatory functions that need to be allowed:

- a. HR Analytics can help automate the processes for government bodies like collecting data from various sources, reporting them to standards as well as timely

addressing them. This will help companies save on taxes as well as non-compliance issue penalties.

- b. HR systems can maintain in-detail records of all the previous decisions made and can recommend the best option available for future decisions. Audits can be a big part of this process. Help with internal policies and employment compliance cases can be taken with these systems.
- c. Equal employment opportunities compliance EEO needs to be aided with the use of HR analytics. The recruitment process, promotion , termination , etc can be implemented with the same.

## **1.2 Research Problem**

The Information Technology (IT) sector is one which is evolving quickly, with high levels of competition, ongoing technological breakthroughs, and an ever more demanding work environment. For IT professionals, these circumstances have made it extremely difficult to

maintain a decent work-life balance. The traditional 9-to-5 work model has been largely replaced by flexible yet extended work hours, remote working conditions, and project-based timelines that often blur the boundaries between professional and personal life. As a result, work-life balance has become known as a crucial issue that affects not just workers' health but also the performance of organizations as measured by employee engagement, productivity, and retention rates.

Human Resource (HR) management practices in the information technology sector have experienced significant changes in sync with these advances. The use of virtual HR shared services, a paradigm that centralizes and virtualizes numerous HR tasks with the goal of increasing efficiency and lowering operating costs, is one of the most noticeable advances. Although the capacity of these services to expedite administrative procedures has been praised, nothing is known about how they will affect IT professionals' work-life balance.

Thus, the uncertainty around the connection between the deployment of virtual HR shared services and IT workers' work-life balance is the root of the issue. There is a dearth of empirical study examining these services' direct or indirect effects on work-life balance, despite the fact that their use is expanding. This void in the literature begs the following queries:

- a. Does the adoption of virtual HR shared services impact the work-life balance of IT professionals?
- b. What specific aspects of virtual HR shared services contribute to changes in work-life balance?
- c. Are there contextual factors, such as organizational culture or job roles, that mediate the relationship between virtual HR shared services and work-life balance?



Our research problem addresses the following but isn't limited to:

- a. Biases at workplace: Identify and evaluate biases in hiring, promotions, performance reviews, and compensation negotiations that are based on race or gender.
- b. Promotion Practices: List the numerous issues that are present in promotional approaches, such as demographic disparities and inequality among different work sectors.
- c. Performance indexes: Assess different groups using machine learning scoring techniques and assist in identifying possible biases based on any sort of discrimination or bias.
- d. Define the necessity of an equitable and rational performance assessment across organizations in order to determine the true potential of every worker.
- e. Employee attrition: The impact of employee turnover, understanding attrition rates as well as understanding factors that lead to it.

Organizations and HR professionals are left without a clear path for maximizing the potential advantages of virtual HR shared services in improving work-life balance due to the lack of comprehensive research addressing these issues. By offering an in-depth analysis of the complicated relationship between work-life balance and virtual HR shared services within the IT industry, this thesis seeks to close this research gap. By means of this inquiry, the research aims to provide evidence-based perspectives and suggestions that may contribute to the development of academic discourse and useful HR tactics.

### **1.3 Purpose of Research**

The primary goal of the research is to investigate the detailed relationship between the implementation of virtual HR shared services and its impact on the work-life balance of information technology professionals. The study intends to close a significant gap in the

body of literature by carrying out a thorough, empirical analysis of this relationship and to offer useful insights for both theoretical and practical applications.

**Objective 1: Identify biases in variations in salaries and hiring decisions.**

Incorporating virtual HR shared services could provide insights into how technology based models process mitigation of biases in salary inequalities and hiring decisions. When virtual HR is implemented, the methods for determining salaries and selecting people may change. Biases' and their impact may be influenced by factors such as algorithmic decision-making models in virtual recruitment platforms and candidates can be treated as one-hot encoded parameters; thereby anonymized during the hiring process. Furthermore, comparing pre- and post-COVID data could demonstrate how virtual HR initiatives influenced the persistence or eradication of biases over time.

**Objective 2: To compare and compute the Promotion basing factors.**

What trends exist in the rate of promotions across job categories, and how do they affect employee demographics and performance metrics?

Virtual HR systems usually include functionality like performance management, promotion, and planning for retirement. Analyzing data from these platforms prior to and following COVID can reveal patterns across job categories. This will help us determine the influence of virtual HR initiatives on the variables used in promotion choices. Understanding these factors will aid in the strategies for increasing inclusivity and fairness in promotion procedures.

**Objective 3: Performance Assessment: How can personal variables in performance assessments impact assessments of employees and bias outcomes?**

Virtual HR systems frequently collect a wide range of data on employees. This includes productivity metrics, project outcomes, and feedback from supervisors and peers. Examining these before and after COVID can show how virtual HR initiatives changed the inclusion of parameters such as gender, race, or socioeconomic position in performance evaluations. Evaluating these dynamics can help to create more equal and effective performance evaluation approaches.

**Objective 4: Employee Attrition Model . Develop a predictive model to identify key factors influencing employee turnover, such as compensation changes, supervisory relationships, and career advancement opportunities.**

Virtual HR systems offer opportunities to gather extensive data on employee experiences, satisfaction levels, and interactions with the organization. By analyzing data from these systems alongside pre and post-COVID workforce data, researchers can develop more accurate predictive models for employee turnover. Virtual HR initiatives may introduce new factors influencing attrition, such as remote work arrangements, digital communication dynamics, or the availability of virtual career development resources. Understanding these factors can enable organizations to proactively address retention challenges and create more supportive work environments.

#### **1.4 Significance of the Study**

Significant aspect 1: What patterns of racial and gender discrimination can be seen in employee records for compensation, promotions, and performance ratings?

How do racial and gender biases affect starting salaries and job placements in the organization as a whole?

Hypothesis: Pay rates and opportunities for advancement in entry-level employment vary greatly by race and gender, with some groups potentially starting at lower levels despite having comparable skills. Does gender discrimination influence the frequency and type of performance feedback that employees receive?

Hypothesis: Female and non-binary employees may receive less constructive feedback than male colleagues.

#### Significant aspect 2: Job Type-Based Promotion Opportunities

Hypothesis: Employees in technical professions, such as engineering or IT, have higher promotion rates than those in support jobs, which may be influenced by demographic factors such as age or gender.

#### Significant aspect 3: Evaluate disparity

Hypothesis: Subjective components of performance assessments lead to errors in employee evaluations, disproportionately affecting minority groups and those in less visible roles.

Significant Aspect 4: Employee turnover is mostly caused by non competitive compensation adjustments, poor management relationships, and limited career development opportunities.

#### **Relevance and Benefits:**

The relevance of this study is manifold. Firstly, it addresses an issue that is of immediate concern to the IT industry, where work-life balance has become a significant factor

affecting employee well-being, productivity, and retention. Secondly, the study is timely, given the increasing adoption of virtual HR shared services as an approach to HR management. Understanding the implications of this adoption on work-life balance is crucial for both organizations and HR practitioners. Thirdly, the study contributes to academic discourse by extending the existing knowledge on HR practices and work-life balance, particularly within the context of the IT industry.

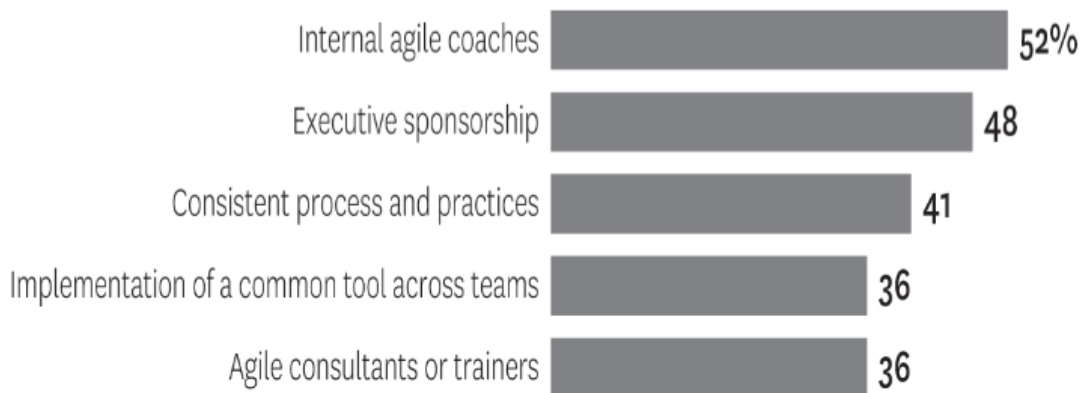
Top challenges with HR disparity:

**Top challenges with scaling...**



**Figure 1.1- Top challenges with scaling**

### ... and elements needed for success



**Figure 1.2- How to adhere to HR scaling**

Source: VersionOne's 2016 State of Agile survey

#### **For Industry:**

- a. **Strategic Decision-Making:** The findings will provide IT companies with evidence-based insights that can inform strategic HR decisions, particularly concerning the adoption and optimization of virtual HR shared services.
- b. **Employee Well-being:** Organizations can improve employee well-being and reduce turnover by implementing strategies to improve work-life balance. This can be achieved by understanding how virtual HR shared services effect this balance.
- c. **Competitive Advantage:** Organizations can obtain an advantage in luring and keeping top people in the IT sector by effectively utilizing virtual HR shared services to improve work-life balance.

#### **For HR Practitioners:**

- **Best Practices:** The study will identify best practices that contribute to the virtual HR shared services in enhancing work-life balance. It will also be providing HR practitioners with actionable guidelines.

- **Policy Development:** The insights gained can help with the development of HR policies that are both efficient and conducive to a healthy work-life balance.

Prior to the pandemic, the majority of HR procedures were conducted in person, with in-person meetings serving as the foundation for most HR initiatives. To lead and support their teams, HR managers and leaders mostly depended on face-to-face interactions, physical presence, and conventional office-based operations. Leaders were frequently evaluated on how well they performed in the workplace and how quickly they responded to problems.

1. **Leadership Responses:** During recessions, executives were supposed to show quick thinking and decisiveness. The Chief Human Resources Officer (CHRO) was crucial in differentiating a leader's errors from their basic ineptitude for the position. The assessment of a leader's resilience was based on how quickly they responded to changes from the outside world and competition.
2. **Systematic Diagnostics:** The CHRO also concentrated on determining the friction points and bottlenecks in the social system's operation. Example: A CEO found misalignment between the R&D team in France and the marketing team in Milwaukee with the assistance of the CHRO, which caused a delay in the launch of the product.

Virtual HR procedures were quickly adopted in response to the COVID-19 outbreak and have since become standard. The significance of digital tools, remote management, and virtual communication platforms has been brought to light by this change.

1. **Virtual Leadership:** Managers have to adjust to overseeing distant teams, preserving output, and guaranteeing workers' welfare via virtual methods. The CHRO's responsibilities have expanded to include virtual diagnostics, which use digital technologies to track and evaluate team dynamics and leader performance.



2. Improved Diagnostics: Real-time tracking of team performance and engagement was made possible by the more frequent and thorough data collection made possible by virtual HR systems. Example: Using virtual meetings and collaborative platforms, disparities between geographically separated teams might be found and resolved more quickly in a virtual environment.

Comparative Analysis:

- a. Prior to COVID-19: In office environments, physical presence and prompt decision-making were indicators of agile leadership. Following COVID-19, leaders showed agility by quickly adjusting to virtual processes and managing remotely with effectiveness.
- b. Prior to COVID-19, the CHRO used in-person diagnostics to find and fix problems within the company. After COVID-19: The use of virtual diagnostics has made it possible to identify bottlenecks and friction areas more accurately and quickly.
- c. Prior to COVID-19: The capacity of leaders to respond to economic downturns through conventional means served as a gauge of resilience. Post-COVID-19: The ability of leaders to function well in a virtual environment, preserving team cohesion and productivity even in the face of physical separation, has redefined resilience.

In conclusion, the significance of this study extends beyond academic contributions to practical implications that can help a wide range of stakeholders, IT organizations, and HR professionals. Through its comprehensive analysis, the research aims to offer a nuanced understanding of how virtual HR shared services can be strategically leveraged to improve work-life balance in the IT industry.

## **1.5 Research Purpose and Questions**

### **1. Location based bias:**

Does diversity in location, gender or race within a team company have any effect on customer satisfaction scale, specially focusing on pre and post work settings?

Hypothesis: The majority of Massachusetts employees advocate for a centralized operational approach, which could have an impact on regional hiring procedures and resource distribution.

### **2. Organizational Composition by Position**

How do external economic factors influence pay scales, hiring rates, and employee turnover play a role in virtual HR shared services as well as its effect on the work-life balance of IT professionals?

Hypothesis: Prominence of 'Production Technician I' positions may cause operational bottlenecks and limited career advancement, resulting in employee dissatisfaction and turnover.

### **3. Top Reasons Employees Leave**

What are the key variables for the employees to leave or stay in the same company ? In over the last 5 years with WFH and WFO conditions, what changes have been implemented?

Hypothesis: Reasons for leaving include seeking a new position, unhappiness, and higher pay, demonstrating disparities in payment, job satisfaction, and intra-company mobility.

### **4. Positions with High Churn :**

Does employee engagement score in a company, correlate with the performance evaluations and turnover rates?

Hypothesis: High churn in jobs such as data architects, production technicians, CIOs, BI Developers, and database administrators could be due to stress, workload, undercompensation, or a lack of professional growth opportunities.

**Solutions:**

**Impact/ solution 1 :** To reduce location-based risks and improve workforce diversity, consider increasing job postings and remote work options beyond Massachusetts. To investigate the extent to which virtual HR shared services have been adopted in the IT industry.

**Impact/ solution 2 :** Create clear career paths and training programs to help production technicians flourish in the organization. Implement cross-training programs to reduce boredom and improve job satisfaction.

**Potential solution 3:** Compare remuneration packages to market standards. Improve internal communication and managerial training to boost job satisfaction and transparency on career advancement opportunities.

**Possible solution 4 :** Review and modify the remuneration arrangements for these roles. Evaluate and improve the task distribution and work-life balance initiatives. To reduce turnover, increase professional development opportunities and mentoring efforts.

## CHAPTER II: REVIEW OF LITERATURE

### **2.1 Theoretical Framework**

Literature review serves as the cornerstone upon which this research is constructed. It offers a strong academic foundation with a focus on HR analytics and its possibilities. It provides a thorough summary of the research, theories, and frameworks that have already been done on the subject of virtual HR shared services and their effects on work-life balance, especially in the IT sector. This thorough evaluation informs the research topics, methods, and study background, serving as more than just an academic draft.

This literature study has several goals in mind. In the beginning, the goal is to map the academic landscape by identifying prominent academics, relevant research documents, and novel theories that have influenced the conversation about work-life balance and virtual HR shared services. This acts as a roadmap, assisting in navigating the intricate terrain of previous study. The second goal of the review is to find areas of agreement among different researchers by emphasizing convergences and divergences in the literature. It is essential to this study to comprehend these disparities in academic standing. Thirdly, the review looks for areas where questions are still unsolved or have not been thoroughly examined in the body of existing research. These gaps are more than just empty areas; they are places where our research may make a meaningful contribution.

Strict guidelines regarding the inclusion of studies have been set in order to guarantee the validity and significance of the literature evaluation. To guarantee that the examined studies fulfill strict academic requirements, only articles that have been published in peer-reviewed journals or conference proceedings are taken into consideration.

This focus narrows the scope of the review, making it both manageable and directly relevant to the research questions. Additionally, to ensure the timeliness of the review, only studies published within the last 15 years are included. Language is also a consideration; the review is restricted to studies published in English to ensure broader accessibility and comprehension. For instance, the paper titled "HR analytics-as-practice: a systematic literature review" by Yanina Espegren and Mårten Hugosson discusses the existing gaps between conceptual understanding and practical applications of Human Resource Analytics (HRA). They conducted a review of 100 academic and practitioner-oriented publications on HRA and analyzed them based on the "HRA-as-practice" frame. The review highlights key HRA practices, how employees apply them, and the connections they make within the HRA nomological network, such as technology, outcomes, and facilitators. The study addresses the approach's drawbacks by stressing the need for abstraction for analytical purposes can lead to an oversimplification of complex HRA processes. The study also notes that a lack of empirical evidence in the current literature prevents a thorough understanding, and it recommends additional research to investigate how various factors influence the implementation of HRA practices in diverse contexts, emphasizing the importance of longitudinal studies to track the evolution and impact of HRA practices.[20]

The literature review is meticulously organized around clear themes, each serving as a building block in the construction of a coherent narrative. The first theme explores the evolution of HR management in the IT industry, tracing its journey from traditional, bureaucratic systems to more agile, technology-driven practices. Comprehending this growth is crucial in bringing the development of virtual HR shared services into perspective. The second subject explores the idea of work-life balance and looks at several definitions, theories, and models put forth. The theoretical underpinnings for measuring

and analyzing work-life balance in the IT industry are provided in this part. Themes that follow examine the characteristics, advantages, difficulties, and complaints surrounding virtual HR shared services provide a fair assessment that takes into account both the positive and negative aspects of these platforms. The review also looks at empirical research that have looked at this relationship, as well as current theoretical frameworks that connect HR practices to work-life balance.

The chapter will be structured as follows: Section 2.1 will introduce the literature review, setting the stage for the academic foundation of this research. Section 2.2 will cover the evolution of HR management in the IT industry, focusing on the transition from traditional practices to innovative approaches like virtual HR shared services. Section 2.3 will delve into the concept of work-life balance, examining its definitions, theories, and models, particularly in the context of the IT sector. Section 2.4 will explore the features and benefits of virtual HR shared services, including their impact on operational efficiency and employee satisfaction. Section 2.5 will discuss the challenges and criticisms associated with the implementation of virtual HR shared services, such as data security concerns and potential depersonalization. Section 2.6 will review existing theoretical frameworks that link HR practices to work-life balance, offering insights into the mechanisms through which they interact. Section 2.7 will summarize empirical studies that have investigated the relationship between virtual HR shared services and work-life balance, highlighting key findings and methodologies. Section 2.8 will examine the role of organizational culture as a mediating or moderating factor in this relationship. Section 2.9 will identify gaps in the existing literature, pointing out areas that this research aims to address. Finally, Section 2.10 will conclude and summarize the critical insights from the literature review, outlining the focus areas for the proposed research.

## **2.2 Evolution of HR Management in the IT Industry**

The limitations of traditional HR approaches directly address how HR Management has evolved in the IT industry both before and after the pandemic. There is a lot of academic and practical interest in the development of human resource (HR) management in the information technology (IT) sector. Since the beginning of the IT business, there have been significant shifts and in order to properly manage talent, HR practices have had to shift with the times. In order to better understand the evolution of HR management in the IT industry, this dissertation will trace its history from traditional personnel management to the current status of virtual HR shared services.

**The Pre-Information Age: Personnel Management:** In the early stages of industrialization, the focus of what we now call HR was primarily on 'personnel management.' This phase was characterized by administrative functions such as payroll, attendance, and basic training (Armstrong, 2006)[4]. The IT industry, in its nascent stage, was no different. Personnel management would deal with problems as they rose and did not strategically plan for the future (Storey, 1992)[46].

### **The Dawn of the Information Age**

The Information Age, defined by the explosive expansion of the IT sector, began in the late 20th century. Businesses such as IBM, Microsoft, and subsequently Google and Amazon emerged as the leaders of this new era. These companies' HR departments began to understand how critical personnel management is in a creative business (Lepak & Snell, 1999)[32]. Administrative duties became less important in favor of strategic management, which includes hiring, developing, and keeping talent (Ulrich, 1997)[49].

## **Globalization and Outsourcing**

Globalization of the IT industry began at the turn of the century. Businesses began outsourcing software development and other services, in addition to manufacturing, to nations with cheaper labor costs (Kakumanu & Portanova, 2006)[31]. HR faced new difficulties as a result, including leading distant teams and adjusting to cultural differences (Stahl et al., 2012)[2].

## **The Rise of Virtual HR Shared Services**

The most recent evolution in HR management in the IT industry is the advent of virtual HR shared services. It basically centralizes HR functions (Marler & Fisher, 2013)[34]. This model has been particularly impactful in improving work-life balance for IT employees, as it allows for greater flexibility and personalization of HR services (Bondarouk & Ruël, 2013).[11]

## **Traditional vs. Virtual HR :**

Human Resources (HR) has always been responsible for managing the most valuable asset of any company: its people.

However, due to advances in technology and the demand for more scalable and effective solutions, the HR landscape is significantly evolving. This thesis examines how technology has changed HR functions, especially in the Information Technology (IT) industry, and how traditional HR is giving way to virtual HR. It also looks at the growth of virtual HR shared services.

## **The Shift Towards Innovative HR Strategies**



Traditionally, paper-based systems, manual procedures, and personal interactions have been the foundation of traditional HR activities. Although successful in the past, this strategy has a number of drawbacks, such as inefficiencies, increased operating expenses, and restricted scalability. Organizations trying to stay competitive in a fast-paced business climate, improve employee experiences, and streamline operations are finding that they require more creative HR methods.

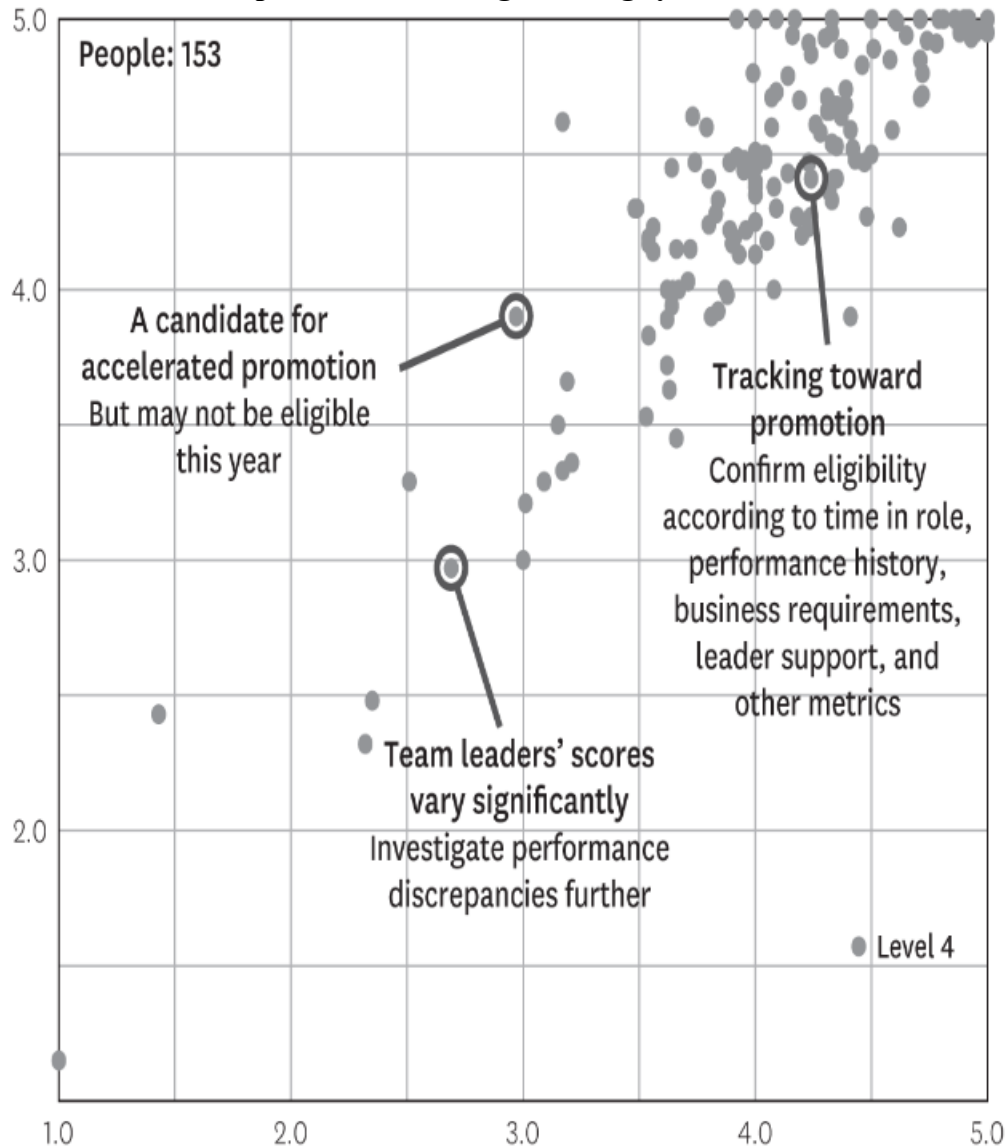
Key components of traditional HR include:

- **Recruitment and Onboarding:** Manual job postings, paper applications as well as in-person interviews.
- **Performance Management:** Annual performance reviews as well as feedbacks were hard to manage.
- **Employee Engagement:** In-person team-building activities.
- **Training and Development:** Classroom-based training sessions were mandatory.

In contrast, HR strategies leverage technology:

- **Digital Recruitment and Onboarding:** Online job portals and virtual interviews.
- **Continuous Performance Management:** Real-time feedback platforms, performance analytics.
- **Employee Engagement Tools:** Digital surveys, virtual engagement platforms, AI-driven insights.
- **E-Learning and Development:** Online training modules, virtual classrooms, personalized learning paths.

## How to address low performance using tracking systems?



**Figure 2.1- Simple Performance Measure by Deloitte.**

### The Advent and Rise of Virtual HR Shared Services:

Several factors contribute to virtual HR shared services:

- Cost Efficiency: Operating expenses are decreased when physical office space and manual labor are not needed.

- Scalability: Virtual services are easily expanded to accommodate growing businesses or shifting labor force compositions.
- Accessibility: Workers have greater convenience and flexibility since they may access HR services from any location.
- Data-Driven Decision Making: offer insightful information to support strategic decisions about human resources.

Key components of virtual HR shared services include:

1. HR Information Systems (HRIS): Centralized platforms for payroll, benefits, compliance, and employee data management.

2. Self-Service Portals: Tools for managers and employees to self-serve on things like performance reviews, benefits enrollment, and leave requests.

3. Virtual Help Desks: Chatbots and AI are frequently used to provide online assistance for questions and problems pertaining to HR.

4. Remote Collaboration Tools: Online forums for communication, teamwork, and virtual meetings.

### **The Impact of Virtual Shared HR Services at TCS: Pre- and Post-COVID Analysis:**

Tata Consultancy Services (TCS) is a leading worldwide IT services and consulting firm. It has a very strong HR architecture with dedicated groups who manage a variety of HR functions.

This thesis looks into the various HR departments of TCS and assesses the effects of moving to virtual shared HR services before and after the COVID-19 pandemic. We seek to get insight into how TCS leveraged technological advancements to boost HR efficacy and efficiency during a pivotal time by conducting this inquiry.

## **HR Teams Within TCS:**

The HR department at TCS is well-organized, with multiple specialized teams and HR functions. Some of the common functions are as follows:

1. Recruitment and Talent Acquisition

In charge of discovering, attracting, and employing talent.

Pre-COVID: In-person interviews and campus recruitment drives.

Post-COVID: Online tests, interviews, and virtual hiring procedures.

2. Employee Relations and Engagement: Focuses on maintaining a positive work environment and employee satisfaction.

Pre-COVID: In-person meetups and hands-on activities.

After COVID: online surveys and feedback systems.

3. Performance Management :

Pre-COVID: training in the classroom.

E-learning modules are post-COVID.

4. Compensation and Benefits: Oversees payroll, benefits and compensation planning.

Pre-COVID: Manual payroll processing and onboarding documentation.

Post-COVID: Automated payroll systems, digital benefits platforms.

At TCS, the introduction of virtual HR shared services had been accelerated by the start of COVID-19. This change had a significant impact:

- Virtual hiring procedures have become common.

Through the use of AI-driven applicant tracking systems, virtual assessment centers, and video interviews, TCS was able to continue hiring new employees in

despite travel restrictions and lockdowns. As a case study, TCS increased hiring efficiency by 20% by targeting a larger talent pool through the use of virtual job fairs and online campus recruitment. Accenture improved the candidate experience by 25% by utilizing virtual reality (VR) for immersive job previews and onboarding.

- **Employee Relations:** Real-time feedback from employees was taken with the launch of the "TCS Pulse" app, which resulted in a 15% increase in employee satisfaction ratings. Accenture's "Accenture Virtual Campus" promoted engagement and ongoing development, leading to an 18% rise in worker satisfaction. Employee satisfaction increased by 17% as a result of the "Deloitte Connect" app's virtual collaboration and engagement capabilities.
- **Performance Management:** A 10% increase in employee performance evaluations resulted from TCS's implementation of an AI-based performance analytics tool that gave managers insightful data. Personalized engagement activities from IBM's "Employee Experience Suite" increased employee retention by 20%.
- **Payroll:** IBM's worldwide payroll automation raised payroll accuracy and cut processing errors by 35%. By streamlining processes, the automated payroll system cut down on processing time by 35%.
- **HR Operations:** HR teams were able to collaborate and access information remotely with ease thanks to cloud-based HR platforms. Example: TCS reduced admin workload by 25% by implementing a centralized HRIS (Human Resource Information System), which integrated all HR processes and data. The unified system reduced administrative workload by 25% while enhancing data integrity and compliance.

### 2.3 Theories of Work-Life Balance

Work-life balance is a multifaceted concept that has been defined in various ways. At its core, it refers to equilibrium between work-related activities and personal life activities (Greenhaus et al., 2003)[25]. Some scholars define it as the absence of role conflict between work and non-work domains (Frone, 2003) [3], while others see it as the satisfaction and at work and home, with a minimum of role conflict (Clark, 2000)[14].

1. **Boundary Theory:** This theory posits that individuals have set boundaries between their work and personal. These boundaries affects work-life balance (Ashforth et al., 2000)[6].

Company Example: Google

Google provides flexible working options and promotes a culture that encourages people to draw clear lines between work and personal life. The company offers on-site amenities such as exercise centers, health programs, and even nap pods to help employees efficiently manage their work-life balance.

Real-Life Scenario: A Google employee can opt to work from home a few days to spend more time with family, while simultaneously taking advantage of the company's on-site daycare services while at work. This flexibility enables individuals to establish and maintain limits that help them manage their professional and personal life.

2. **Spillover Theory:** This theory suggests that emotions, skills, and behaviors from the work domain to the non-work domain and vice versa (Staines, 1980)[38].

### **Company Example: Starbucks**

Starbucks focuses on creating a good and friendly place to work that can favorably impact employees' personal lives. The organization provides full education programs, employee appreciation initiatives, and opportunities for professional development.

Real-Life Scenario: A barista who feels loved and supported at Starbucks may develop good customer service abilities and a happy attitude that extends to personal contacts outside of work. Similarly, the cooperation and communication skills acquired at Starbucks can help them improve their personal connections and community involvement.

3. **Resource Drain Theory:** This theory argues that resources (time, energy, etc.) used in one domain (e.g., work) are unavailable for use in another domain (e.g., personal life), affecting work-life balance (Edwards & Rothbard, 2000)[18].

### **Company Example: Amazon**

Amazon is widely known for its tough work environment, which can result in exhaustion of resources because employees' time and energy are significantly invested in their professions, leaving little time for personal activities.

Real-Life Scenario: An Amazon warehouse worker may work lengthy shifts with heavy physical demands, depleting their energy and time, leaving them weary and with little capacity to engage in personal or family activities. This heavy workload highlights the resource drain theory as it allocated the resources to work.

4. **Role Strain Theory:** According to this hypothesis, people feel under pressure to fulfill the expectations of the various roles they play, which has an impact on their work-life balance. (Goode, 1960)[24].

### **Company Example: Deloitte**

Employees at Deloitte often handle several responsibilities, including client management, project delivery, and internal duties. The organization is aware that job stress may occur and has taken precautions against it.

Actual Situation: It might be difficult for a Deloitte consultant to balance the demands of client assignments with internal responsibilities like mentoring junior staff members or participating in business committees. By helping employees balance these conflicting responsibilities, Deloitte's flexible work arrangements and support services—such as counseling and time management training—help to reduce role pressure.

Particular focus on the necessity for work in the future stems from the business need to maintain the expedited remote work method that was used during the epidemic to create new working practices. The key is evident in Deloitte's mapping of 75 forces which highlights the declining cost of automation, human-machine collaboration, AI's impact on white-collar jobs, crowdsourcing and the development of freelancing, mobility, and the future of work. The evolution of Human Resource Shared Service into Virtual Human Resource Shared Service (vHRS) is contingent upon the maturity and accessibility of People, Process, and Technology.



These illustrations demonstrate how various work-life balance theories are addressed and impacted by actual organizations, providing insight into how they oversee worker productivity and well-being. Organizations use shared services for human resources to increase the efficacy and efficiency of the HR department. In order to accomplish their objectives, the shared services for human resources have grown over time in terms of flexibility, aggregation, and arbitrage. Like other technology-driven shared services, Human Resources can now function remotely anytime needed thanks to its worldwide talent & technology use. The pandemic has undoubtedly made it urgent to accelerate the development of shared virtual human resources services.

Theoretical Frameworks Linking HR Practices to Work-Life Balance:

- **Job Demands-Resources Model:** According to this notion, HR procedures have the potential to either increase job expectations and lead to stress and a bad work-life balance, or they can offer resources that help with work-life balance (Bakker & Demerouti, 2007). [7].
- **Person-Environment Fit Theory:** According to this theory, work-life balance has been impacted by the degree to which an individual's demands and opportunities and amenities provided by their job (Edwards et al., 1998)[19].
- **Social Exchange Theory:** According to this hypothesis, workers are more likely to feel that their company values their contributions and well-being through positive HR practices, which improves work-life balance. (Blau, 1964)[10].
- **Strategic HRM:** This suggests that strategic HR practices. In case of virtual HR shared services, they need to align with organizational objectives and also enhance work-life balance (Wright & McMahan, 1992)[42].

### **Virtual HR Shared Services and Work-Life Balance**

Work-life balance can be greatly impacted by virtual HR shared services as a strategic HR practice. Better work-life balance can be achieved through virtual HR's automation , flexible scheduling options, and customized employee services. (Bondarouk & Ruël, 2013; Marler & Fisher, 2013) [8].

### **Work-Life Balance: Theories, Challenges and Impact on Well-being and Productivity.**

Work-life balance (WLB) is import for modern employment. In this fast-paced and challenging IT industry, we investigate major theories and models describing work-life balance. We also discuss the problems of achieving work-life balance in the IT sector, and and productivity hacks.

## **2.4 Features and Benefits of Virtual HR Shared Services**

In the rapidly evolving field of information technology, virtual HR shared services are a game-changing approach to human resource management. The centralization and automation of HR functions is one of the main characteristics of virtual HR. This makes it possible to expedite procedures including hiring, onboarding, performance evaluation, and benefits administration, all of which can be accessed online (Marler & Fisher, 2013) [7]. Utilizing data analytics is another characteristic that helps HR managers make decisions based on evidence (Angrave et al., 2016). [22]

Virtual HR also often includes self-service portals where employees can manage various aspects of their employment, from updating personal information to accessing training modules (Bondarouk & Ruël, 2013) [8]. As an increasing number of organizations incorporate big data into their daily operations, there has been a recent trend towards data-driven decision making in numerous business domains including the HR domain. This change is brought by convergence of demographics, globalization, and information technology leading to substantial changes in execution of various HR related tasks. The paper titled “ An ROI-based Review of HR Analytics: Practical Implementation Tools” addresses the gap in understanding how HR analytics impacts organizational performance through an ROI (Return on Investment) perspective. Despite advances in HR analytics, decision-makers have inadequate practical direction on how to integrate and achieve tangible benefits. The paper offers an integrative analysis of literature on HR analytics and practical tools for decision-makers on the adoption and implementation of the same. It identifies workforce planning and recruitment as highest yielding HR tasks while also proving effectiveness of HR analytics tools in enhancing organizational decision-making and strategy.[36] The paper titled "A Pragmatic Approach on Adoption of EDA to Make Intelligent Business Decisions" discusses how corporate industries, including marketing,

finance, supply chain management, information technology, and customer relationship management, recognise the value of data-driven insights.

However, HR departments have found it difficult to establish a direct link between data analysis and improved business performance. The paper assesses the value of Business Intelligence (BI) and Exploratory Data Analysis (EDA) in managing workforces and their effect on performance by utilizing Python-based EDA tools like AutoViz, Pandas-profiling, and SweetViz for exploring data and drawing insights from it, thus making the study relevant across multiple data scenarios. This significantly impacts corporate data analysis and decision-making processes, providing strategic benefits. Though, owing to the reliance of this study on the capabilities of specific EDA tools, it might not generalize across all tools and hence there's a need for developing more advanced EDA tools and techniques that can handle larger datasets and provide more profound insights.[5]

The paper "HR Analytics and Organizational Effectiveness" dives right into the existing gap between practical implementation and the theoretical understanding of HR analytics, despite its growing popularity and recognized potential. The study conducts a systematic review of existing literature on HR analytics with the aim of illuminating the processes involved, the emerging trends, the antecedents, the consequences, and the factors influencing the successful adoption of HR analytics by collecting data from published journals on Human Resource Analytics (HRA) and collating it to draw conclusions about the state of HR analytics and its impact. The article identifies key limitations including a lack of data analytics skills within HR, poor IT infrastructure, and insufficient investment from the business.[40] The paper titled "Identification of Human Resource Analytics Using Machine Learning Algorithms" presents a comprehensive analytics framework that

utilizes machine learning and mathematical programming to optimize HR recruitment decisions. This framework is required to improve decisions being made, as an example the Variable-Order Bayesian Network (VOBN) model was applied to the recruitment data. This improved recruitment decisions. Using multilayer factors like diversity and overall recruitment success, the mathematical programming technique maximizes recruitment throughout the organization. The results, however, may not apply to smaller businesses or those without thorough recruitment records because they are mostly applicable to large organizations with abundant data availability. In order to improve the predicted accuracy and applicability of the tools, future study could investigate the integration of new data sources, such as current labor market trends and individual employee input.[43]

The paper titled “Identification of Human Resource Analytics Using Machine Learning Algorithms” presents an analytics framework for machine learning and mathematical programming to optimize such HR recruitment decisions. By balancing several organizational goals including worker diversity and recruitment success, the framework attempts to improve decision-making processes in the recruitment process. The study made use of a sizable dataset that included hiring records for tens of thousands of workers, covering a diverse variety of demographics. The recruiting data was subjected to the Variable-Order Bayesian Network (VOBN) model, which furnished HR managers with valuable insights to facilitate and enhance recruitment decisions. Using multilayer factors like diversity and overall recruitment success, the mathematical programming technique maximizes recruitment throughout the organization. The results, however, may not apply to smaller businesses or those without thorough recruitment records because they are mostly applicable to large organizations with abundant data availability. In order to improve the predicted accuracy and applicability of the tools, future study could investigate

the integration of new data sources, such as current labor market trends and individual employee input.[43]

Choosing virtual HR shared services has numerous advantages. First off, by automating repetitive processes, it increases efficiency and frees up HR personnel to work on more strategic projects (Strohmeier & Piazza, 2015) [47]. Second, it improves work-life balance, which is important for employee satisfaction and retention, particularly in the IT sector (Allen et al., 2015) [1]. This is achieved by making HR services more accessible to employees, enabling them to use them whenever and wherever they choose. In conclusion, the utilization of data analytics yields practical understanding of worker behavior and requirements, allowing companies to anticipate problems and maximize efficiency (Guenole et al., 2017) [26]. Overall, virtual HR shared services offer a blend of efficiency, accessibility, and data-driven decision-making that is increasingly becoming indispensable in modern organizations.

## **2.5 Challenges and Criticisms of Virtual HR Shared Services**

The paper “Bridging the Gap: Why, How, and When HR Analytics Can Impact Organizational Performance” shows the uncertainty about the impact of HR analytics. It collects data from 155 Irish organizations and by using structural equation modeling, tests a model linking HR technology, evidence-based management (EBM), and organizational performance. The results validate the hypothesized chain model, indicating that HR analytics are made possible by HR technology access, further facilitating EBM and improving organizational performance. However, due to cross-sectional design of the study, its ability to test causality between the variables remains limited and owing to the small sample size, generalization is affected. The paper suggests overcoming this limitation by collecting longitudinal data across multiple industries and countries. [37]

The paper titled “HR Disruption—Time Already to Reinvent Talent Management” examines the issues that rapid changes in demographics, technology, and globalization offer to traditional people management strategies. These shifts are prompting businesses to reconsider how they manage and engage their employees. The paper offers new approaches that integrate management frameworks like design thinking, agile and analytics while drawing qualitative insights from a network of HR practitioners in the Pacific Northwest and Belgium. As a concluding note the authors suggest that we must transition from traditional talent management to modern management frameworks to recruit and retain talent. However, owing to the restricted sample size, there stems a need for further empirical studies to validate the proposed modifications and assess their influence on organizational performance and employee satisfaction.[15] The paper titled "A Pragmatic Approach on Adoption of EDA to Make Intelligent Business Decisions" discusses how corporate industries, including marketing, finance, supply chain management, and

customer relationship management, recognise the value of these insights. However, HR departments have found it difficult to establish a direct link between data analysis and improved business performance. The paper assesses the value of Business Intelligence (BI) and Exploratory Data Analysis (EDA) in managing workforces and their effect on performance by utilizing Python-based EDA tools like AutoViz, Pandas-profiling, and SweetViz for exploring data and drawing insights from it, thus making the study relevant across multiple data scenarios. This significantly impacts corporate data analysis and decision-making processes, providing strategic benefits. Though, owing to the reliance of this study on the capabilities of specific EDA tools, it might not generalize across all tools and hence there's a need for developing more advanced EDA tools and techniques that can handle larger datasets and provide more profound insights.[41]

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However, owing to the restricted sample size, there stems a need for further empirical studies to validate the proposed modifications and assess their influence on organizational performance and employee satisfaction.[38] The authors conclude by suggesting that in order to attract and retain talent, we need to move from traditional talent management to contemporary management frameworks. However, because of the small sample size,



additional empirical research is required to validate the suggested changes and evaluate their impact on employee satisfaction and organizational performance.

### **Challenges in Implementing Virtual HR Shared Services**

- **Data Security:** One of the most significant challenges in implementing virtual HR shared services is ensuring data security. HR departments handle sensitive employee information, and the transition to a virtual platform raises concerns about unauthorized access and data breaches (Dinev & Hart, 2006) [17].
- **Integration Issues:** Many organizations already have existing HR systems in place. Integrating these with new virtual HR platforms can be complex and time-consuming, often requiring significant changes to existing workflows (Ruël et al., 2004) [40].
- **User Adoption:** Employees and HR professionals alike need to adapt to the new virtual system. Resistance to change can be a significant hurdle, affecting the successful implementation of virtual HR services (Laumer et al., 2010) [28].
- **Cost:** While virtual HR services can be more cost-efficient in the long run, the initial setup and transition costs can be substantial, posing a challenge for smaller organizations.
- **Technical Glitches:** As with any technology-based system, virtual HR services are not immune to technical issues, ranging from software bugs to server downtimes, which can disrupt HR functions (Stone et al., 2015) [13].

## **Criticisms and Limitations**

- **Depersonalization:** One of the most common criticisms of virtual HR is that it can make HR processes feel impersonal. The lack of face-to-face interaction can lead to misunderstandings and a sense of detachment (Parry & Tyson, 2011) [27].
- **Data Privacy Concerns:** Virtual HR systems collect a large amount of data, raising concerns about how this data is used and who has access to it. Ethical considerations around data usage and consent are increasingly coming to the forefront (Martin & Freeman, 2003) [16].
- **Over-reliance on Technology:** The automation of HR tasks can lead to an over-reliance on technology, potentially making organizations vulnerable to technical failures and cyber-attacks (Kavanagh et al., 2018) [29].
- **Limited Customization:** While virtual HR systems offer a range of features, they may not meet the unique needs of every organization, requiring additional customization that can be costly and complex.

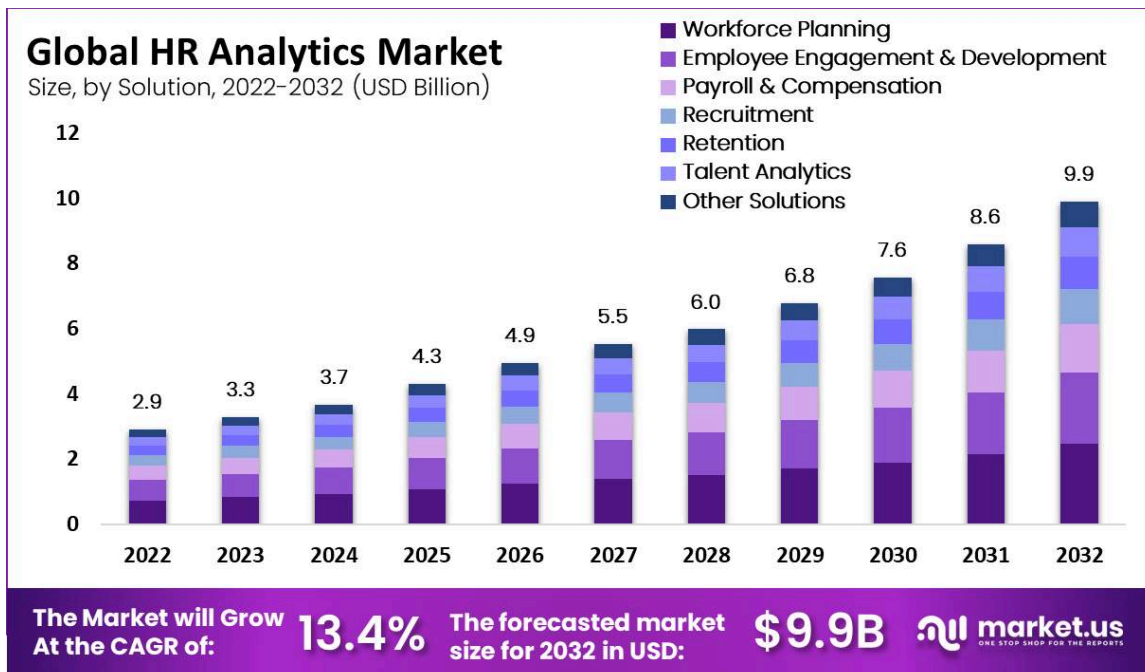
The paper titled “Disrupted HR?” deliberates the interferences caused in human resource management (HRM) due to three global mega-trends: flexible workforce, digitalization of business models, and artificial intelligence and machine learning. The article criticizes the slow response of HRM to such black swan event and the disparity already existing between HR research and practice. Upon analyzing various practice-oriented publications, HR reports, and academic research, the authors propose a new paradigm that includes a flexible workforce, digital business models, and AI-driven processes. They suggest that that HRM has been resistant to change, adhering to outdated models that do not effectively address the dynamics introduced by digitalization, AI, and workforce flexibility.

Additionally, COVID-19 pandemic has accelerated the need for HR to adopt more agile and technologically integrated approaches to manage and support the workforce. The article poses a limitation as it lacks empirical data to support some of the proposed changes. Conducting more empirical studies, developing more detailed and practical guidelines for HR practitioners to implement these new models effectively, and exploring the long impact of these mega-trends on HR practices, particularly post-pandemic would enable in further strengthening the research. [44] In the paper “A Critical Review of Algorithms in HRM: Definition, Theory, and Practice” the recent rise in the use of algorithms within the HRM space, driven by advancements in data analytics and their commercial applications has been discussed at great length. With the existing disparity between the theoretical grounding of these algorithms and their practical application, the authors intend to provide clear definitions and applications of these algorithms in the HRM. The study incorporates key findings of 22 academic papers and 122 items such as popular press and trade journals, gathered through integrative synthesis review procedures from major databases like ProQuest Databases and Web of Knowledge. Algorithms are frequently mislabelled as "black boxes," but in actuality, they operate more transparently in academic research than in application, where the intricacies of the algorithms are often not disclosed. To further corroborate the proposed frameworks, empirical studies need to be carried out, and the practical limitations of implementing HRM algorithms in diverse organizational settings. [45]

## **2.6 Theoretical Frameworks Linking HR Practices to Work-Life Balance**

### **Empirical Studies on Virtual HR Shared Services and Work-Life Balance**

The paper titled "Big Data and HR Analytics in the Digital Era" by Pauli Dahlbom, Noora Siikanen, Pasi Sajasalo, and Marko delve into functioning of HR by utilizing human resource analytics (HRA) and big data, its implications, and limitations. The paper achieves the mentioned objectives by conducting qualitative interviews with nine leading Finnish companies. The findings indicate various obstacles in adopting advanced HRA such as technical barriers, HR lacking analytical and business acumen, inadequate data quality, and bad IT infrastructure. As the study mainly focuses on large Finnish companies, it restricts to smaller organizations. The paper makes the need for more empirical investigation into the factors influencing HRA efficacy and adoption in many corporate settings. Additionally, it promotes the use of longitudinal research to monitor the development and results of HRA practices across time. [35] The restricted application and potential abuse of big data in human resource management (HRM) have been extensively covered in the study "The questions we ask: Opportunities and challenges for using big data analytics to strategically manage human capital resources."



**Figure 2.2- HR Analytics Market Share, Growth | CAGR of 13.4%**

With the use of primary and secondary data sources, such as surveys from HR professionals in a range of industries and an extensive analysis of the body of literature on big data applications in HRM, the study seeks to shed light on how HR functions can be strategically enhanced by big data and positively impact organizational outcomes. Big data in HRM is said to offer improved strategies for attracting and retaining personnel, improved employee performance management, and the capacity to do predictive analytics on attrition and retention. However, because the study mostly depends on self-reported data from HR experts, bias may be present, which could compromise the validity of the findings.[39]

The paper "HR Analytics and Organizational Effectiveness" dives right into the existing gap between practical and the theoretical understanding of HR analytics. The study conducts a review of existing literature on HR analytics with the aim of illuminating the emerging trends, the consequences, and the factors influencing the successful adoption of

HR analytics by collecting data from published journals on Human Resource Analytics (HRA) and collating it to draw conclusions about the state of HR analytics and its impact. The article identifies key limitations including a lack of data analytics skills with poor IT infrastructure, and insufficient investment from the business.[40]

In the paper titled “Examining the Determinants of Successful Adoption of Data Analytics in Human Resource Management – A Framework for Implications” the authors explore the challenges faced in adoption of (HRA) owing to the complexity of integrating an analytics-based approach. The challenges faced include organizational, environmental, data governance, and various individual factors. These challenges are mitigated by adopting a framework that incorporates a review of existing literature for the adoption of data analytics in human resource management. While the study offers an insight into the obstacles faced in adopting HRA, it relies heavily on secondary data and literature reviews, which limit the findings to specific organizations. Ergo, conducting empirical research would further strengthen the proposed framework and help explore how these factors play out in different organizational settings.[36] The paper titled “Using HR Analytics to Support Managerial Decisions: A Case Study” discusses the obstacles that organizations encounter when implementing HR analytics to make strategic contributions and support managerial choices. The obstacles include confounding and imbalanced HR data, difficulty in processing structured and unstructured data. The study intends to overcome these challenges by implementing a comprehensive framework that encompasses descriptive analysis, predictive analysis, and entity sentiment analysis to address various HR issues. It draws on conclusions by analyzing data collected from an industrial aluminum company by applying machine learning algorithms to predict employee turnover and performing sentiment analysis on unstructured data from employee engagement surveys. The

implementation of the HR analytics framework revealed actionable issues inside the organization, such as main causes of employee turnover and opportunities for improvement in employee engagement. While predictive analytics with machine learning algorithms revealed risk indicators for employee turnover. Also, entity sentiment analysis of survey data revealed insights into employee attitudes towards many components of their working environment. Although the study offers a deep insight into HR analytics, it uses predictive models that were mostly based on structured data, and while unstructured data was analyzed for sentiment, incorporating these findings into larger HR strategies may necessitate additional refinement.[33]

In the paper titled “The questions we ask: Opportunities and challenges for using big data analytics to strategically manage human capital resources” the limited utilization and possible misuse of big data in human resource management (HRM) has been discussed at great length. The study provides a clearer understanding of how big data can be strategically used to enhance HR functions and influence organizational outcomes positively by utilizing a combination of primary and secondary data sources, including surveys from HR professionals across various industries and review of existing literature on big data applications in HRM. The proposed benefits of utilizing big data in HRM include enhanced talent acquisition tactics, more effective employee performance management, and the ability to do predictive analytics on turnover and retention. The study however may show bias as it relies heavily on self-reported data from HR professionals, and this may affect the validity of the results.[39]

The paper titled “Predicting Employee Attrition Using Machine Learning Techniques” addresses a major concern that impacts the organizational stability and performance – employee attrition. It emphasises the need for more reliable predictive technologies to

assist HR departments anticipate potential attrition risks based on a variety of employee-related variables. The authors seek to understand and predict the reasons behind employee decisions to leave, enabling HR departments to intervene proactively by applying machine learning techniques to predict employee attrition effectively. They make use of a dataset provided by IBM Analytics, containing approximately 1500 employee records with 35 different features including demographic details, job satisfaction levels, performance metrics, and other work-related characteristics. The study identifies Gaussian Naïve Bayes classifier as the most effective algorithm (particularly for the dataset involved in the study), with a recall rate of 0.54, indicating its efficiency in identifying true positive attrition rates. It also indicated certain factors such as job satisfaction, monthly income, and work-life balance significantly influence employee decisions to leave the organization. To gain further insight into the employee attrition issue, further refinement of machine learning models, thus improving predictive accuracy and including real-time data analysis would be required. This would thereby enable HR practitioners to take proactive decisions. [21]

The paper titled “ Predicting Employees under Stress for Pre-emptive Remediation using Machine Learning Algorithm” revolves around the theme of using ML algorithms to predict stress levels among employees, enabling organizations to intervene pre-emptively to mitigate adverse effects. It particularly highlights the increase in employee stress rates caused by changes in daily patterns and environments due to the COVID-19 pandemic. The ML models are trained on 1500 samples splitted into training and testing sets and include various parameters such as Employee ID, Age, Average Daily Hours, and other variables. As a result, key predictors such as increased working hours and workload were identified to negatively impact employee performance. Further it must be noted that XGB classifier was effective in predicting stress with reliable model performance. However, as



the study pertains to a specific period (COVID-19 pandemic), the generalizability of the results to other times or non-pandemic circumstances may be affected. [23]

The paper titled “ COVID 19-related burnout among healthcare workers in India and ECG based predictive machine learning model: Insights from the BRUCEE-Li study” focuses on the high rates of burnout among Indian healthcare personnel, particularly in low- and middle-income nations such as India. It assesses the burnout during the COVID-19 pandemic and creates an heart rate variability (HRV)-based predictive (ML) model to detect it. The Mini-Z 1.0 survey was used to collect data from 1615 healthcare professionals, divided into three categories: frontline, second-line, and non-COVID HCWs. Stress, job dissatisfaction, working in chaotic circumstances, and COVID-19's major impact on mental well-being were all linked to increased burnout rates. The ML model created utilising demographic and HRV variables accurately predicted burnout, with the Extra tree classifier doing the best. However, the study's findings may have limited generalizability due to the specific demographic and healthcare settings in India, and the cross-sectional limits the ability to ascertain causality between observed associations and burnout. Future research should aim to replicate these findings in other geographic and healthcare settings, and refine the ML model to improve its accuracy and sensitivity. [48]

The paper titled “COVID-19 Pandemic in the New Era of Big Data Analytics: Methodological Innovations” offers a comprehensive review in big data analytics that can be applied to study and manage global crises like the COVID-19 pandemic. It highlights several big data methodologies that have been underutilized in research, such as descriptive/diagnostic, predictive, and prescriptive analytics. The authors also mention advanced technologies such as AI and robotics. Various machine learning algorithms like

as artificial neural networks (ANNs), convolutional neural networks (CNNs) or recursive neural networks (RNNs) are gaining traction owing to superior performance. Although AI and its integrated algorithms offer significant advantages, several studies suggest that success depends on collaboration between humans and computers rather than solely relying on one party's intelligence. Looking ahead, it is essential to unveil the black box of AI using explainable AI (XAI) techniques to ensure both prediction accuracy and explainability. [50] Some tools are mentioned in Figure 2.3 below.



**Figure 2.3- HR analytics tools market by segment**

The paper titled “ HR Analytics: Employee Attrition Analysis Using Logistic Regression” describes the matter of employee attrition and its significant impacts on an organization's competitive advantage, highlighting the costs related to the HRM life cycle, lost knowledge, employee morale, and organizational culture. The study analyzes the employee attrition using logistic regression, by collecting data regarding various employee attributes

of approximately 4,410 employees across different departments of a firm over a span of 261 working days and processing it using R. The logistic regression model achieved an accuracy of 75%, with a sensitivity of 73% and a specificity of 75%. The study identified key predictors such as the companies worked, total working years, years with the current manager, and employee engagement metrics such as job satisfaction and work-life balance. Though the model's predictive accuracy is moderate, there's room for improvement in capturing more complex attributes or interactions between variables. [41]

The paper titled “ Predicting the Work-Life Balance of Employees Based on the Ensemble Learning Method” identifies hurdles associated with attaining an ideal equilibrium between work and personal life for employees, a challenge exacerbated by recent shifts in work dynamics like remote arrangements prompted by the COVID-19 pandemic. The primary challenge lies in accurately assessing and enhancing work-life balance to mitigate risks of employee burnout and turnover. The authors utilize ensemble learning techniques on the dataset obtained from Kaggle - IBM HR Analytics Employee Attrition & Performance, including responses from 1,470 employees and comprising 35 features covering demographics, job characteristics, and opinions on job satisfaction. The research indicated machine learning models, especially ensemble techniques such as Random Forest and Extreme Gradient Boosting, demonstrated notable accuracy in forecasting work-life balance. Ensemble learning methods, known for combining multiple models, consistently surpassed single-model strategies in managing the intricacies and fluctuations within the dataset. Notably, the most successful models effectively distinguished between extremes of work-life balance but encountered challenges when discerning intermediate levels. However, some models did not perform consistently across all categories of work-life balance, indicating potential overfitting or underfitting issues. [48]








## 2.7 Gaps in the Existing Literature

While there has been considerable research on various aspects of Human Resource Management, Virtual HR, and Work-Life Balance, several gaps in the literature still exist, particularly in the context of the IT industry. Artificial intelligence (AI) powered by "machine learning" technology has the potential to transform.

- The paper titled “ A Review Paper on Artificial Intelligence at the Service of Human Resources Management” dives deep into this topic by analyzing existing literature and case studies on the application of AI in HR from various sources. It also delineates on the effectiveness of these technologies, and identifies gaps where future research could be directed. It highlights the importance of Employing AI in HR as it facilitates the making of decisions that are more informed and impartial based on data. However, despite its advantages, the uptake of AI in HR is inconsistent and encounters obstacles concerning its integration with current HR systems and a shortage of expertise in the field. [9]

### Gap analysis representing present business intelligence scenario

This slide represents the gap analysis to help organizations understand the gaps so that they could build effective strategies to eliminate these gaps and achieve desired results. It represents gap analysis showing the current scenario of an organization.

 Current State	 Desired State	 Gap	 Strategies to Fill Gap
35% Absenteeism rate	15% Absenteeism rate	20%	
25% Employee turnover rate	10% Employee turnover rate	15%	 Use HR analytics software to facilitate HRM in taking better and informed decisions
40% Employee engagement rate	70% Employee engagement rate	30%	 Add text here
50% Employees productivity rate	80% Employees productivity rate	30%	 Add text here

This slide is 100% editable. Adapt it to your needs and capture your audience's attention.

**Figure 2.4- Human Resource Analytics Gap Analysis Representing Present Business**

- Limited Focus on IT Industry: Most studies generalize HR practices across industries, with limited research focusing specifically on the unique challenges and opportunities in the IT sector (Kossek et al., 2014) [30].
- Lack of Longitudinal Studies: Much of the existing research is cross-sectional, providing a snapshot rather than a comprehensive understanding of how Virtual HR impacts work-life balance over time (Allen et al., 2015) [24].
- Under-Exploration of Employee Perspective: While there is ample research on the organizational benefits of Virtual HR, there is less focus on how employees themselves perceive and engage with these platforms (Bondarouk & Ruël, 2013) [8].
- Geographical Limitations: Most studies are conducted in Western contexts, leaving a gap in understanding how cultural and geographical factors might influence the effectiveness of Virtual HR shared services (Bardoel et al., 2014) [8].
- Technological Advancements: The rapid pace of technological change means that many studies become quickly outdated, and there is a lack of research on the latest Virtual HR technologies and their impact on work-life balance (Strohmeier & Piazza, 2015) [23].
- Interdisciplinary Approaches: There is a gap in literature that combines insights from Information Technology, Human Resource Management, and Psychology to provide a holistic view of how Virtual HR impacts work-life balance (Angrave et al., 2016) [22].
- Quantitative vs Qualitative: While there are numerous quantitative studies measuring the impact of Virtual HR, there is a dearth of qualitative studies that explore the lived experiences of employees interacting with Virtual HR platforms (Marler & Fisher, 2013) [7].

- **Strategic Alignment:** Few studies explore how Virtual HR shared services align with broader organizational strategies and objectives, and how this alignment impacts work-life balance (Wright & McMahan, 1992) [19].
- **Policy Implications:** There is a lack of research on the policy implications of implementing Virtual HR shared services, especially in terms of legal and ethical considerations (Guenole et al., 2017) [25].
- **Small and Medium Enterprises (SMEs):** Much of the research focuses on large organizations, leaving a gap in understanding how Virtual HR can be effectively implemented in SMEs (Lepak & Snell, 1999) [3].

## **2.8 Conclusion and Summary**

This comprehensive review has explored various facets of Human Resource Management, focusing on the evolution from traditional HR to virtual HR shared services, particularly in the context of the IT industry. We delved into the definitions and theoretical frameworks that underpin the concept of work-life balance and how HR practices, especially virtual HR, impact this balance. The features and benefits of virtual HR shared services were discussed, highlighting their transformative potential for modern organizations. Finally, we identified several gaps in the existing literature, providing avenues for future research.

CHAPTER III:  
METHODOLOGY

**3.1 Operationalization Key Concepts**

Insights into how effective hiring and firing processes, a data-driven approach to managing human resources, and future prediction are all provided by HR metrics. The success of the organization is directly impacted by this. HR metrics are numerical measurements that are used to monitor and evaluate an organization's HRM procedures' accuracy and effectiveness.

Numerous topics are covered through these strategies, such as hiring, employee happiness, performance, training, retention, and productivity. They offer insightful information that improves HR procedures, enhances decision-making regarding strategy, and raises the overall efficiency of the business.

Let's examine some frequently used HR metrics and how your company can monitor and make use of them.

<b>HR Metric</b>	<b>Definition</b>	<b>Calculation</b>
<b>Employee Turnover</b>	workers that quit their jobs within a given time frame.	$(\text{Number of terminations during period} / \text{Number of employees at beginning of period}) \times 100$
<b>Absenteeism</b>	the regular absence of an employee from work without cause or notification.	$(\text{Number of absent days} / \text{Total working days}) \times 100$

<b>Revenue per Employee</b>	mean income earned per worker.	Total revenue / Total employees
<b>Employee Net Promoter Score</b>	a measure of staff loyalty	eNPS = % promoters – % detractors
<b>Cost per Hire</b>	The cost associated with recruiting an employee	(Internal costs + External costs) / Total number of hires

**Table 3.1- HR metrics and how to monitor them.**

**1. Employee turnover:**

High employee churn rates are a sign of internal issues within the organization, such low wages, unsatisfactory productivity. One important HR indicator is employee turnover for HR analytics. It helps us to measure how often employees leave a company in a particular window of time, generally a year or two.

$$ET = (\text{Total Number of Terminations Over Time} - \text{Number of Employees at the Beginning}) \times 100.$$

For instance, if a business had 500 workers at the beginning of the year and 50 terminations, its employee turnover rate would be:

$$\text{Employee Turnover} = \left( \frac{50}{500} \right) \times 100 = 10\%$$

**2. Absenteeism:**

Employees' unscheduled absences are absenteeism like health problem, personal life. It may be a big indicator of problem with your health, your personal life, or your employment.



$$\text{Absenteeism Rate} = \left( \frac{\text{Number of absent days}}{\text{Total working days}} \right) \times 100$$

For instance, if a worker missed 15 days out of a year's 250 working days:

$$\text{Absenteeism Rate} = \left( \frac{15}{250} \right) \times 100 = 6\%$$

If left unchecked it will indicate a level of unhappiness.

### 3. Revenue per Employee:

The average revenue produced by each employee is revenue per employee.

$$\text{Revenue per Employee} = \frac{\text{Total revenue}}{\text{Total number of employees}}$$

If a business hires 200 people and makes \$5,000,000 in revenue:

$$\text{Revenue per Employee} = \frac{5,000,000}{200} = 25,000$$

### 4. Employee Net Promoter Score (eNPS):

Employee satisfaction and loyalty are measured using eNPS. It is separated into three groups: **Detractors, Passive/Neutral, and Promoters.**

#### 1. Promoters

- Score: 9-10
- Icon: A happy, enthusiastic employee.

Description: Workers that are really happy and devoted to the company.

They actively market the company. These workers are passionate brand ambassadors who help spread good word of mouth and draw in new talent.

#### 2. Passive/Neutral

- Score: 7-8
- Icon: A moderately satisfied employee.

Description: Employees who are moderately satisfied but not actively engaged or enthusiastic about the company. They do not exactly harm the company, but also not contribute significantly to its growth.

### 3. Detractors

- Score: 0-6
- Icon: A dissatisfied, unhappy employee.

Description: They are dissatisfied and unhappy with the company. They criticize the company. These employees are a risk to the organization and also spread negative sentiments both internally and externally.

It is based on survey responses from staff members, employees, clients, etc regarding how likely they are to suggest the company as a place to work.

$$eNPS = \%Promoters - \%Detractors$$

The eNPS would be as follows if 60% of workers are promoters, 20% are passives, and 20% are detractors:  $eNPS=60\%-20\%=40$

### 5. Cost per Hire:

The average cost of hiring a new employee is determined by a statistical measure called cost per hire. It covers expenditures for things like background checks, recruiting advertising, and administrative charges.

$$\text{Cost per Hire} = \frac{\text{Internal costs} + \text{External costs}}{\text{Total number of hires}}$$

The cost per hiring, assuming 50 individuals are hired and the entire recruitment cost is

\$100,000, is as follows:

$$\text{Cost per Hire} = \frac{100,000}{50} = 2,000$$

## **6. Dates of Performance Reviews:**

The dates on which employees' performance reviews are held out are commonly referred to as performance review dates. Usually, these assessments evaluate the productivity and job performance of the person. Setting objectives, getting feedback, and pinpointing areas in need of development all depend on regular performance reviews. They are also very important when it comes to decisions on pay, training requirements, and promotions.

The data contains the date of the most recent performance review for each employee. The regularity and promptness of performance reviews are monitored with the help of this data. By examining the dates of performance reviews, organizations may ensure that evaluations are conducted on a regular basis and identify any irregularities or delays in the review process.

## **7. Employee Engagement Scores**

Engagement ratings are often determined by asking employees to rate various aspects of their work experience on a scale (e.g., 1 to 10). An overall engagement score is derived from these ratings together. An employee is generally involved in their work if, for example, their survey responses average eight out of ten.

The employee engagement score is a measure of an employee's level of emotional investment and participation with their organization. Higher engagement scores are generally associated with higher levels of job satisfaction and loyalty.

Relevance: Employees who take pride in their work are more productive, provide better customer service, and are less likely to leave the organization. Therefore, monitoring engagement metrics can help businesses identify areas for improvement and create strategies to boost employee morale.

Finding patterns and relationships between engagement and other factors, including department, job function, or tenure, can be facilitated by analyzing engagement ratings. It's also useful to identify the organizational sectors with high and low involvement.

### **8. Time to Hire**

One of the most important recruitment parameters is the "time to hire," which is the number of days that elapse between a candidate's application and acceptance of a job offer. It provides opinions regarding the experience of candidates and the efficacy of hiring.

$$\text{Average time to hire} = \frac{\text{Time to hire for 1st candidate} + \text{Time to hire for 2nd candidate} + \dots + \text{Time to hire for nth candidate}}{\text{Total number of jobs}}$$

Recruitment Effort: The time to hire is a measure of how long it takes HR to proceed with an applicant through the stages of evaluation, interview, and acceptance of an offer.

Applicant Experience: A protracted hiring procedure may have a detrimental effect on the applicant experience, leading to the withdrawal of possible candidates who may then accept offers from rival companies.

### **9. Cost per hire:**

Internal Costs: Expenses incurred during internal hiring processes, including Recruiter compensation, employee referral bonuses, and administrative fees.

External Expenses: costs related to hiring from outside sources, such as fees for recruiting agencies, job advertisements, and background check services.

$$\text{Cost per hire} = \frac{\text{Internal costs} + \text{External costs}}{\text{Total number of hires}}$$

It aids to evaluate the success and economic viability of the hiring procedure. Budgeting and recruiting strategy optimization can benefit from an understanding of the cost per hire.

<b>Internal Costs</b>	<b>External Costs</b>
In-House Recruiter Salaries	Job Board and Posting Fees
HR Administrative Support Expenses	Background Check Services
Onboarding and Signing Bonuses	Social Media and Online Advertising
Managerial Time for Interviews and Assessments	Recruitment Agency and Headhunter Fees
Recruitment Software, Tools, and Technologies	External Job Advertising
Employee Referral Bonuses and Incentives	Career Fair and Event Participation Fees
Internal Training and Development for Recruiters	Third-Party Candidate Screening Services
Office Supplies, Equipment, and Overhead Costs	Employer Branding and Marketing Campaigns
Internal Meetings, Coordination, and Travel	Executive Search Firm Fees

**Table 3.2- Internal Vs External costs of hiring procedures**

- 10. Time of Measurement:** For appropriate analysis, the expenses and the number of hires should be computed over a predetermined time frame, like monthly or yearly.

### **3.2 Description of Data Features:**

The various features included in the dataset such as absences, performance review dates, and employee engagement scores.

#### **a. Employee Demographics**

Name, Date of Birth, Age, Gender, Marital Status:

These basic demographic variables must exist in order to separate the data and look for patterns based on different ages, males and females, and marital status. They facilitate an understanding of diversity and inclusivity inside the organization. They aid in comprehending inclusion and diversity within the company.

Features:

- Employee\_Name: The worker's name.
- DOB: The employee's birthdate.
- Sex: the employee's gender.
- MaritalDesc: A description of the marital status.

Importance:

- Recognizing inclusion and diversity throughout the company.
- recognizing trends associated with various demographic groups.

#### **b. Employment Details :**

Date of Hire, Reasons for Termination, Department, Position Title

The details shed light on the worker's tenure, reason(s) for leaving the company, departmental allocation, and hierarchical standing. By examining these characteristics, trends in career advancement, departmental difficulties, and turnover rates can be identified.

Features:

- DateofHire: The date of the employee's hiring.
- DateofTermination: If relevant, the date on which the person was let go.
- TermReason: The cause of the dismissal.
- Department: Title of Department.
- Position: The job title of the worker.

Importance:

- examining tenure and career advancement within the company.
- determining the causes of employee attrition and departmental difficulties.

- c. **Pay Rate:** An employee's pay rate is the amount they get in compensation; this can be documented on an hourly, monthly, or annual basis.

Significance: Conducting a compensation study is essential to guarantee fair and competitive wage structures inside the company.

Features:

- Salary: Annual salary of the employee.
- Information Display: The pay rate for every employee is included in the dataset, which makes it easier to analyze compensation trends and benchmark salaries.

- d. **Manager Name:**

The name of the manager or direct supervisor of the worker.

Features: ManagerName.

Importance: Analyzing the impact of managers on worker performance and satisfaction is made easier by having a solid understanding of reporting mechanisms.

Assessing team engagement and performance under various managers.

## **What Makes HR Metrics Significant?**

1. The strategic management of talent
  - HR data is useful for assessing talent gaps and needs.
  - They provide assistance when it comes to deciding on, fostering, and sustaining staff. This results in focused initiatives that improve workforce competencies.
2. Maximizing Expenditures
  - HR analytics aid in sensible budgetary allocation by examining expenses associated with hiring, training, and attrition.
  - They spot possibilities to cut costs.
  - By demonstrating possible cost savings and returns on investment, HR may support expenditures made on staff development.
3. Supporting Strategic Planning:
  - Forecasts and trends are made feasible by HR metrics, which are crucial for growth and strategic planning.
  - They coordinate workforce planning with extended corporate objectives.
  - This guarantees that the company has the talent it needs to take on new challenges.

### 4. Improving Decision-Making:

Data-driven insights from HR metrics evidence-based decisions. For example, data on the impact of wellness programs on absenteeism will help decide the company whether to continue, expand, or change these programs.

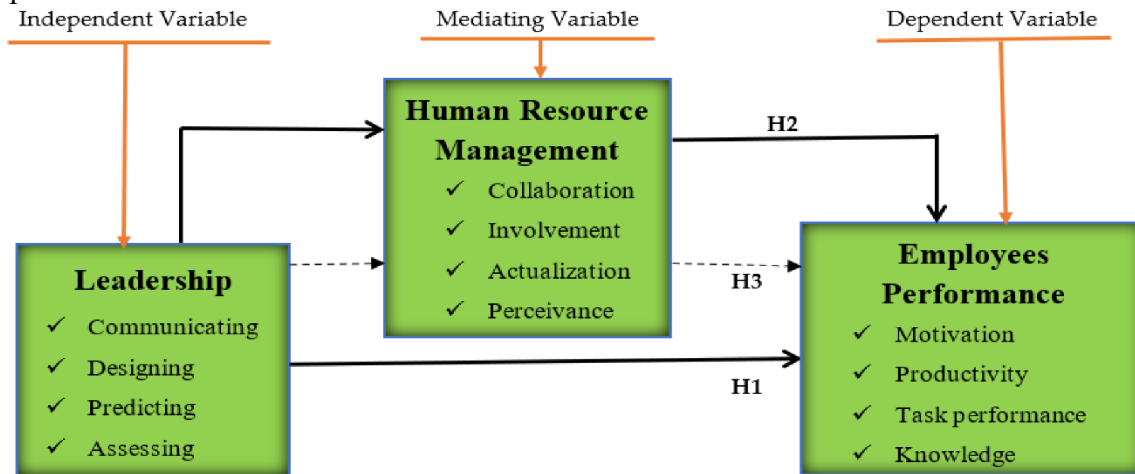
### 5. Emphasizing the Effects of HR Efforts on Performance within the Organization:

Monitoring HR indicators reveals how they contribute to important outcomes for the company. This demonstrates how HR initiatives have a substantial effect on performance. It facilitates obtaining funding and executive support for upcoming HR initiatives.



### 3.3 Research Design

This research employs a mixed-methods design, combining quantitative data analysis with qualitative feedback from HR students and educators.



**Figure 3.1- Linking leadership to employee performance.**

The dataset is the main source of quantitative data; qualitative information about the data's impact on learning is gathered via surveys and interviews.

#### A. Data collection stage:

##### Planning Stage

- Define data collection goals and necessary data.
- Specify involved departments, roles, and employee levels.
- Identify required staff, budget, and technology.

##### Data Sources

- Internal: Utilize payroll, HRIS, and employee surveys.
- External: Incorporate labor market statistics and industry benchmarks.

##### Data Collection Methods

- Surveys and Questionnaires: Gather direct employee information.
- Interviews and Focus Groups: Obtain qualitative insights.
- Automated Capture: software for demographic, attendance

## **B. Exploratory Data Analysis (EDA):**

The main attributes of the dataset are summarized and shown as part of the EDA process. This process usually involves generating summary statistics, presenting distributions, and identifying trends or irregularities in the data.

Impact on Business: Enterprise Data Analysis (EDA) helps organizations understand the basic characteristics and setup of their data. By identifying patterns and trends, organizations can make well-informed decisions and pinpoint areas that need improvement or attention.

## **C. Preprocessing and Data Cleaning:**

In order to prepare the data for analysis, this step involves filling in any missing values, correcting errors, and formatting the information. Possible phases in this procedure include duplicate removal, categorical variable encoding, and normalization.

Impact on Enterprise: Clear and well-prepared data ensures the accuracy and trustworthiness of subsequent research. It helps businesses steer clear of misleading results and ensures that decisions are well-founded.

## **D. Descriptive Statistics**

Metrics like mean, median, mode, standard deviation, and variance are used in descriptive statistics to highlight the salient features of the data. It provides a brief overview of the data's central tendency and dispersion.

Impact on Enterprise: Using descriptive statistics, which offer an overview of the dataset, businesses may rapidly understand the distribution and variability of the dataset. Understanding this is necessary for establishing performance benchmarks and standards.

### **E. Correlation Analysis:**

Examining correlations between the different variables in the dataset is the goal of correlation analysis. It establishes whether and how much two variables are related to one another. Effect on Enterprise: Firms are better able to identify interdependent components when correlations are recognized. For example, there is a strong correlation between employee engagement and performance ratings, which highlights the importance of increasing engagement to improve performance.

### **F. Analysis of Regression:**

Regression analysis models the relationship between a dependent variable and one or more independent variables. It helps in understanding the influence of numerous factors and projecting outcomes.

Effect: Regression analysis clarifies the relationships between various factors and significant business outcomes. HR departments, for instance, can estimate staff turnover based on factors like engagement scores, performance reviews, and remuneration in order to take proactive measures to lower it.

### **G. Analysis of Variance (ANOVA):**

A statistical technique called Analysis of Variance (ANOVA) is employed to compare the means of three or more groups. It helps determine whether there are statistically significant differences between the means of multiple groups.

Impact on Business: ANOVA can help organizations identify key differences among several departments, cohorts, or populations. For example, understanding the variations in departmental performance could aid in the creation of more targeted training and development programs.

## **H. Performance Metrics Analysis:**

This involves the calculation and analysis of certain HR performance metrics, including employee turnover, revenue per employee, absenteeism, and cost per hiring.

Impact on Enterprise: The analysis of these metrics yields practical insights into the effectiveness and efficiency of HR practices. For example, if a department's high turnover rate indicates management issues or dissatisfaction among employees, a management review may be necessary.

### **I. Analysis of Qualitative Data Thematically:**

In order to identify significant themes and patterns, the process of thematic analysis involves the coding and classification of qualitative data. It is used to examine data from interviews or open-ended survey questions. Impact on Business: The application of thematic analysis helps enhance comprehension of employee perspectives and experiences. Qualitative data insights can provide context for specific patterns or trends, which can enhance quantitative results. Understanding what employees have to say about the culture of the company, for example, could help direct efforts to improve the corporate atmosphere.

## **3.4 Population and Sample:**

HR professionals and students enrolled in New England College of Business' HR Metrics and Analytics course make up the study's population. For the study, a sample of fifty students from the course was chosen, offering a varied representation of backgrounds and experience levels.

## **3.5 Participant Selection**

Based on their registration in the HR Metrics and Analytics course, participants were chosen. Because everyone enrolled in the course was allowed to participate, a thorough understanding of the dataset's efficacy at various ability levels was guaranteed.

### **3.6 Impact on business:**

The data analysis techniques mentioned have the following effects on business:

- **Making Informed Decisions:** Businesses can use both quantitative and qualitative research to help them make data-driven, empirically informed decisions.
- **Enhanced HR Procedures:** By having a thorough awareness of important HR metrics, organizations may enhance their hiring, onboarding, performance management, and employee retention processes.
- **Enhanced Employee Engagement:** By determining the factors that influence employee engagement and performance, businesses can implement targeted strategies to boost morale and productivity.
- **Operational Efficiency:** Revenue per employee and cost per hiring analysis can help organizations allocate resources more effectively and efficiently.
- **Strategic Planning:** Organizations can anticipate trends and prepare for possible roadblocks by employing data analysis insights to forecast and plan ahead.
- **Implementing focused interventions in regions with high absence or turnover rates** can help businesses address underlying issues and improve overall organizational health.

Businesses acquire understanding of their workforce, pinpoint areas for improvement, and put strategies into place that increase performance using these tactics.

## CHAPTER IV:

### RESULTS

#### 4.1 Research Findings

The study's findings and outcomes are presented in this chapter, with a particular emphasis on how virtual HR shared services affect work-life balance, especially for IT professionals. Descriptive research, factor analysis, correlation analysis, multiple regression analysis, interaction effects study, and structural equation modeling are only a few of the areas covered by the investigation.

The main topic of the study is the significant variation in data analytics expertise among HR practitioners. Despite the growing significance of data-driven decision-making in the field of human resources, many HR professionals encounter difficulties when attempting to effectively utilize data analytics technologies. This discrepancy is problematic because, in the present business environment, HR departments are expected to use data to make well-informed decisions about hiring, employee engagement, retention, and performance management. If HR staff members are not proficient in data analytics, they will be at a disadvantage and unable to effectively support the strategic goals of their organizations.

Problems with HR analytics worldwide:

- **Restricted Access to Relevant Data:** In order to perform thorough studies, HR professionals frequently do not have access to comprehensive and relevant datasets. Many of the existing datasets are either very basic or inadequately customized to meet the unique requirements of HR.

- **Inadequate Training:** Data analytics abilities are frequently overlooked in traditional HR education and training programs. Because of this, a large number of HR professionals join the field lacking the requisite analytical skills.
- **Complexity of Analytics solutions:** A lot of HR professionals think that the data analytics solutions that are now available are complicated and hard to master. Although very strong, tools such as Tableau Desktop demand a degree of skill that many HR professionals lack.
- **Quickly Changing HR Measures:** The fundamental data points and KPIs for HR are ever-changing. It might be difficult to learn new things and adapt to these changes on a constant basis without the correct tools and assistance.

## 4.2 Descriptive study

The COVID-19 epidemic had a major impact on human resources (HR) and HR analytics. Organizations now gather, evaluate, and use HR data differently as a result of the pandemic. The goal of the model was to give HR professionals practical advice on how to enhance work-life balance and general employee wellbeing.

For preprocessing, following steps were taken:

- Handling Missing Values: Rows and columns with a high percentage of missing data were eliminated, or missing values were substituted using appropriate statistics (such as the mean for numerical data or the mode for categorical data).
- One-Hot Encoding: One-hot encoding was used to transform categorical variables, such as department names and job titles, into numerical representation.
- Feature Creation: To make the analysis easier, new columns were created based on the data that was already there. To differentiate data before and after the implementation of virtual HR services, for instance, a PostImplementation column was added.
- Data Standardization: Normalization: To guarantee that every feature contributes equally to the study, numerical data was normalized.
- Outlier Detection and Treatment: Outliers can distort statistical analyses and model predictions so they were removed.

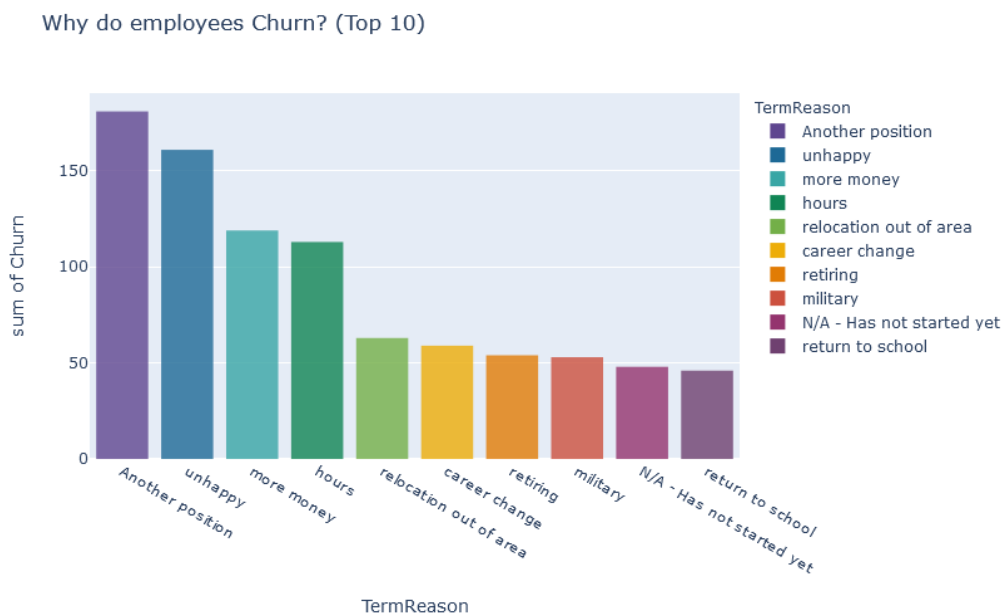
Depending on data and the prediction ,we tried to choose suitable machine learning algorithms like Random Forest, Logistic Regression, or Decision Trees.



**Performance Metrics:** Measures like accuracy, precision, recall, F1-score, and area under the ROC curve (for classification models) were used to assess the model's performance. Metrics such as Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE) were employed for regression models.

**Cross-validation:** To make sure the model is robust and prevent overfitting, cross-validation techniques, etc will be addressed. To enhance the model's performance, the hyperparameters were adjusted. This required modifying variables like the regularization strength in logistic regression and the depth of trees in a random forest.

**Insights on churn pre and post covid:**



**Figure 4.1- Factor 1: Employees Churn (Top 10 Reasons)**

**Factor 1: Why Do Employees Churn? (Top 10 Reasons)**

The top 10 reasons why employees quit the company are displayed in this bar graph, where the x-axis lists the reasons for leaving and the y-axis totals the number of churn incidents.

### Top Reasons for Churn:

- **Another Position:** The most common reason for churn, indicating that employees often leave for opportunities elsewhere.
- **Unhappy:** A significant number of employees leave due to dissatisfaction with their current job.
- **More Money:** Employees also leave for better pay elsewhere.
- **Hours:** Issues with work hours are a notable reason for leaving.
- **Relocation, Career Change, Retiring, Military, N/A, Return to School:** Other reasons include relocating, career changes, retirement, military service, and returning to school.

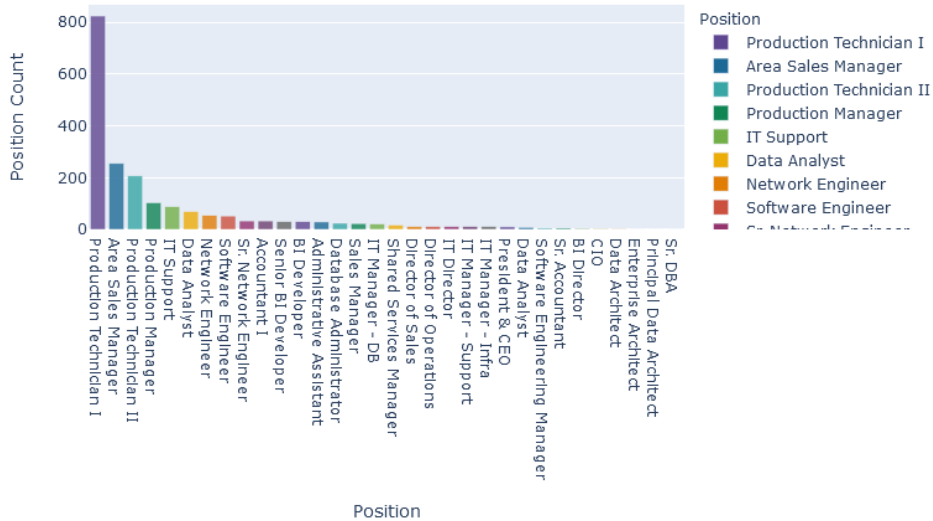
### Pre-COVID-19:

1. **Stability in Top Reasons:** Reasons like seeking another position, dissatisfaction, and better pay have traditionally been top reasons for employee turnover.
2. **Predictable Patterns:** Employee churn patterns were relatively stable and predictable, driven by career growth, dissatisfaction, and financial incentives.

### Post-COVID-19:

1. **Shift in Priorities:** The pandemic has likely shifted employee priorities, with increased emphasis on work-life balance and job security.
2. **Remote Work Influence:** Issues related to remote work, such as inadequate work-from-home support or dissatisfaction with remote work policies, might have emerged but are not explicitly listed here.
3. **Health and Safety Concerns:** Concerns about health and safety, either at the workplace or in personal life, may also influence churn but are not captured in this dataset.

What is the company makeup by position?



**Figure 4.2: Company Makeup by Position**

**Factor 2: What is the Company Makeup by Position?**

With the position count on the y-axis and a list of job titles on the x-axis, this bar chart illustrates how employees are distributed among the company's different positions.

Top Positions:

- Production Technician I: The highest count, indicating a large workforce in production-related roles.
- Area Sales Manager, Production Technician II, Production Manager: Other significant roles include sales management and further production positions.
- IT Support, Data Analyst, Network Engineer: Technical and IT-related positions also have notable representation.

Pre-COVID-19:

- **Traditional Roles Dominated:** Roles related to production, sales, and technical support were prominently staffed, reflecting the company's operational focus.
- **In-Person Requirements:** Many of these roles required in-person presence, especially in production and sales, where direct interaction and hands-on work were essential.

Post-COVID-19:

- **Shift to Remote Work:** Positions that can be effectively performed remotely, such as IT support and data analysis, may have seen adjustments in terms of work arrangements.
- **Restructuring of Roles:** Some roles might have been restructured or seen shifts in responsibilities due to changes in business operations and remote work policies.
- **Emphasis on Digital Transformation:** Increased focus on digital transformation and remote work capabilities may have influenced the demand for IT and tech roles, though this is not directly reflected in the current company makeup.

### **Impact of COVID-19 on Churn Reasons**

**Pre-COVID Stability:** Prior to the pandemic, the causes of employee turnover were more predictable and centered on financial incentives, professional promotion, and dissatisfaction.

**Post-COVID Shifts:** Although they aren't specifically mentioned here, the pandemic probably brought in additional factors that affect employee churn, like the difficulties of working remotely, health issues, and the desire for employment stability.

The following are some significant variables that influenced HR analytics both before and after the pandemic:

Prior to COVID-19:

- Conventional Work Environments: On-Site Work: Since most employees worked on-site, gathering information about work hours, productivity, and interactions among coworkers was comparatively easy.
- Standard Performance Metrics: In-person observations and standard performance metrics, like attendance and punctuality, were frequently the basis for performance reviews.
- Stable Workforce Dynamics: Predictable Employment Patterns: HR analytics were made possible by comparatively stable employment patterns and turnover rates.
- Standardized Training Programs: Training and development initiatives for employees were frequently carried out in-person.
- Stable Workforce Dynamics: Predictable Employment Patterns: HR analytics were made possible by comparatively stable employment trends and high turnover rates.
- Standardized Training Programs: In-person, face-to-face employee training and development workshops with standardized curriculum and delivery were frequently held.
- Minimal Data on Remote Work: Because remote work was less frequent, there was less information available on involvement and productivity. Emphasis on In-Person Engagement: In-person events and activities were the main emphasis of employee engagement programs. Conventional Data Sources: HRIS (Human Resource Information Systems), performance reviews, questionnaires, and other structured data sources were examples of well-established data collection techniques.

- Historical Data-Based Predictive Models: Predictive analytics models were based on the more stable and predictable tendencies found in historical data.

After COVID-19:

- Shift to Remote Work: A significant shift to remote and hybrid work models, requiring new metrics for tracking productivity and engagement.
- Virtual Teamwork: A more significant reliance on technology for virtual collaboration has led to the collecting of fresh types of data about employee interactions and communication styles.
- Adaptive Workforce Dynamics: Variable Employment Trends Workforce stability is impacted by changes in employment trends, such as furloughs, rehiring, and layoffs.
- Agile Training Programs: Make the switch to online training and development initiatives, which call for flexible and adaptable ways of training delivery.
- Safety and Health Issues: Health Monitoring: A emphasis placed on the health and safety of employees, including gathering information on health screenings, COVID-19 testing, and immunization history.
- Changing Sources of Data: Innovative Techniques for Gathering Data: adoption of novel techniques for gathering data, such as virtual surveys, digital monitoring tools, and real-time feedback.
- Evolving Sources of Data: Innovative Methods for Gathering Data: adoption of novel techniques for gathering data, such as virtual surveys, digital monitoring tools, and real-time feedback.
- Adaptive Predictive Models: There is a need for models that can adjust quickly to shifting circumstances and uncertainty.

- Initiatives for Virtual Engagement and Employee Engagement and Retention: creation of virtual engagement programs to preserve staff connectedness and morale.
- Pay Attention to Retention Techniques: a greater emphasis on retention tactics to handle the difficulties of remote work and guarantee staff loyalty and happiness.
- Regulatory Conformance: Adherence to New Regulations: ensuring adherence to recent legislation pertaining to data privacy, remote work guidelines, and health and safety.

### **4.3 Factor analysis of Impact on HR Analytics**

In response to the COVID-19 epidemic, a shift in HR analytics is necessary to capitalize on the new opportunities and overcome the problems posed by the changing nature of work. Important realizations would be:

1. Enhanced data collection methods: To gather information on virtual engagement, employee wellness, and remote work, etc create new techniques.
2. Adaptive analytics: Tools for analytics and predictive models must be more flexible and sensitive to shifting circumstances and unpredictabilities.
3. Emphasis on wellness: A stronger emphasis will be placed on the analysis of data pertaining to support programs, mental health, and employee wellness.
4. Technology : A greater use of AI for real-time analytics and decision-making is needed into HR procedures.

#### **Analysis:**

##### **1. What States Do Most of the Employees in the Study Reside in?**

#### **Pre-COVID:**

- **Concentration in Massachusetts (MA):** Massachusetts (MA) accounts for 90% of the company's workforce, making it its principal place of business. This concentration probably corresponds to where the company's main operations and headquarters are located.
- **Consequences:** Having a local workforce base makes it simpler to administer and coordinate in-person events and guarantees that state-specific laws are followed.



**Post-COVID:**

- **Potential Geographic Diversification:** Policies allowing for remote work may have allowed workers to work from different states, which could have resulted in a small regional diversification.
- **Consequences:** HR may face difficulties in sustaining corporate culture, coordinating efforts, and complying with regulations if employees are more widely distributed.

**2. What is the Organizational Composition by Position?**

**Pre-COVID:**

- **High Concentration in Production Roles:** 45% of the company is staffed by 'Production Technician I', followed by 17% as 'Production Technician II', and 9% as 'Area Sales Manager'.
- **Implications:** The heavy reliance on production roles indicates the company's focus on manufacturing or production-centric operations. These roles often require on-site presence, making remote work less feasible.

**Post-COVID:**

- **Operational Adjustments:** In order to preserve social distance, the pandemic probably required changes to the way production roles are managed. These changes might have included adding more automation or modifying shift patterns.
- **Consequences:** HR must handle the particular difficulties that employees encounter, like requirement for in-person health and safety issues.

### 3. What are the Top Reasons Employees Leave?

#### Pre-COVID:

- **Key Reasons for Churn:** The main causes are dissatisfaction, higher income, and moving on to another job. These explanations emphasize typical career goals and causes for discontent with the present employer.
- **Production Department Churn:** A high incidence of employee turnover in the manufacturing sector could be a sign of issues with fair compensation, a positive work atmosphere, or job satisfaction.

#### Post-COVID:

- **Shift in Priorities:** The pandemic altered employees' priorities and increased emphasis on job security, work-life balance, and remote work options.
- **New Churn Factors:** Turnover may also be caused by other elements like health issues, difficulties working remotely, and burnout from stress associated to the epidemic.

### 4. Are Some Employees More or Less Likely to Churn Under Some Managers?

#### Pre-COVID:

- **High Churn Under Specific Managers:** A few managers brought up management problems like inadequate guidance, insufficient support, or poor communications.
- **Implications:** addressing these issues help with management training.

**Post-COVID:**

- **Management Adaptability:** The epidemic put managers' capacity to adjust to new work environments—like remote management—to the test. The churn rates of managers who battled with this might be greater.
- **Implications:** Continuous development programs for managers to handle remote teams are essential.

**5. Which Positions Have the Highest Associated Churn?**

**Pre-COVID:**

- **High Churn Positions:** Data architects, technicians, CIOs, developers, and DB admins have high churn rates. These positions may be high market demands, and thus leading to frequent job changes.
- **Implications:** HR can focus on retention strategies. Some of them are compensation, career development opportunities, and improving job satisfaction.

**Post-COVID:**

- **Role-Specific Challenges:** The pandemic may have increased workload for IT and data roles due to digital transformation and remote work infrastructure.
- **Implications:** Addressing specific challenges faced by high-churn roles through tailored support, workload management, and ensuring job security can help mitigate churn.

#### 4.4 Correlation analysis

For HR professionals and MBA students, understanding the nuances of data exploration is essential, particularly in the context of the evolving workplace dynamics influenced by COVID-19.

Important Phases in the Analysis of Data:

- a. Descriptive Statistics A glimpse of the major tendency and variability of the dataset can be obtained by summarizing the data using metrics like mean, median, standard deviation, and range.
- b. Distribution Analysis: It is possible to detect normal distributions, skewness, and the existence of outliers by visualizing the distribution of important data.
- c. Correlation Analysis: Investigating correlations between variables reveals connections that could be useful for deeper analysis and predictive modeling.

```
Each attribute has the following amount of unique values:  
0 Employee_Name           Values: 3308  
1 Position                Values: 32  
2 State                   Values: 28  
3 DOB                     Values: 306  
4 Sex                     Values: 2  
5 MaritalDesc             Values: 5  
6 CitizenDesc             Values: 3  
7 HispanicLatino          Values: 4  
8 RaceDesc                Values: 6  
9 DateofHire              Values: 99  
10 DateofTermination       Values: 105  
11 TermReason              Values: 18  
12 EmploymentStatus        Values: 5  
13 Department              Values: 6  
14 ManagerName             Values: 22  
15 RecruitmentSource       Values: 23  
16 PerformanceScore        Values: 4  
17 LastPerformanceReview_Date Values: 43  
18 Original DS             Values: 2
```

**Figure4.4- Dataset overview**

Null Values

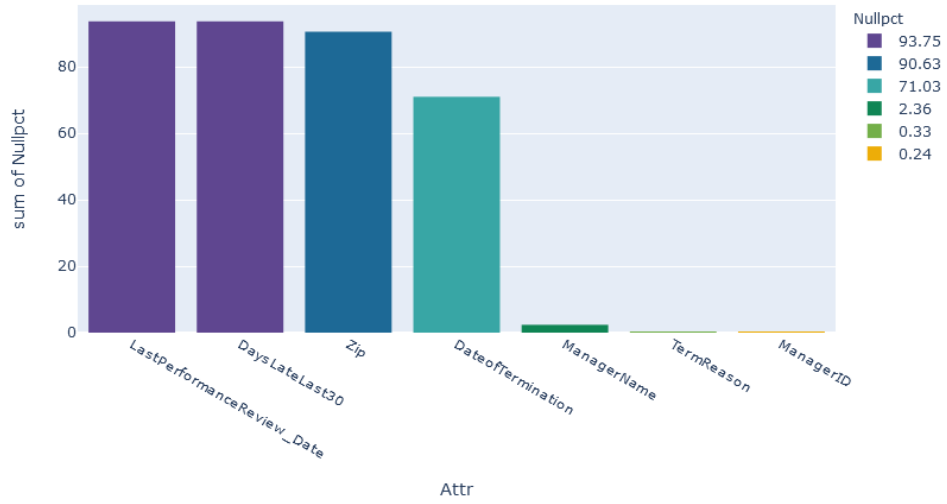


Figure4.5- Null values in dataset

Correlations - Final Set of Model Data

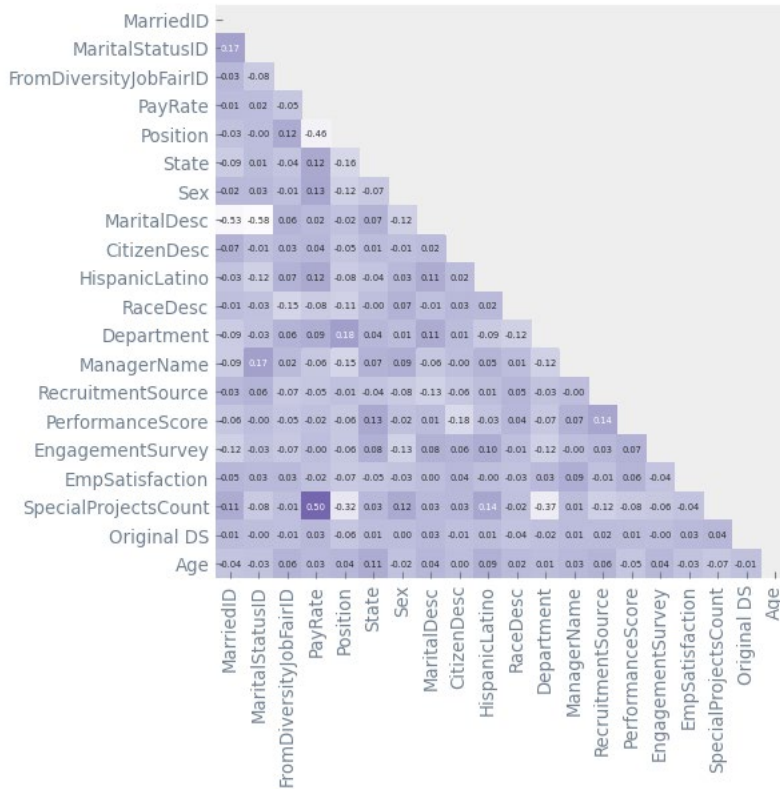


Figure 4.6- correlations in dataset

A table displaying correlation coefficients between variables is called a correlation matrix. The correlation between two variables is shown in each cell of the table. The value falls between -1 and 1:

- a. A perfect positive correlation is shown by a value of 1, that as one variable rises, the other variable rises as well.
- b. A perfect negative correlation is represented by a value of -1, that when one variable rises, the other falls.
- c. A correlation score of 0 means that changes in one variable do not predict changes in the other.

### **Components of the Correlation Matrix**

- **Diagonal Elements:** The diagonal elements are always 1 because each variable is perfectly correlated with itself.
- **Off-Diagonal Elements:** The correlation coefficients between two sets of variables are represented by these items. Take the relationship between PerformanceScore and EngagementSurvey, for instance.

Key observations:

#### **1. High Positive Correlations:**

The correlation coefficient between MaritalDesc and MaritalStatusID is 0.38, suggesting a somewhat positive association. Given that marital status ID is probably a numerical representation of marital descriptors, this makes reasonable. Department and Special Projects Count: A moderately positive link is suggested by the correlation coefficient of 0.18. This could mean that prospects for special initiatives are greater in some departments than in others.

## **2. High Negative Correlations:**

The correlation between MaritalDesc and CitizenDesc is -0.38, indicating a moderately negative relationship. This can be an indication of varying marital statuses among workers with various nationality statuses. There is a 0.14 association between the performance score and the engagement survey. It does suggest that there is some correlation between improved performance scores and increased engagement, albeit a weak one.

## **3. Low or No Correlations:**

PayRate and State: There is a lack of connection between the pay rate and the state, as the correlation is nearly zero (-0.01). ManagerName and RecruitmentSource: The correlation is likewise nearly nil (0.00), indicating that there is no discernible relationship between the recruiting source and any particular manager.

## 4.5 Multiple Regression Analysis

The main goal was to predict key HR outcomes like employee satisfaction and churn rates and assess the impact of virtual HR shared services. The steps included:

- **Handling Missing Values:** Eliminating rows/columns with high missing data percentages or imputing missing values.
- **One-Hot Encoding:** Transforming categorical variables into numerical representations.
- **Feature Creation:** Adding new columns to simplify analysis, such as PostImplementation.
- **Data Standardization:** Normalizing numerical data to ensure equal feature contributions.
- **Outlier Detection and Treatment:** Removing outliers to prevent skewed analyses.
- **Choosing Machine Learning Algorithms:** Selecting suitable algorithms like Random Forest, Logistic Regression, or Decision Trees.
- **Performance Metrics:** Evaluating model performance using accuracy, precision, recall, F1-score, MAE, and RMSE.
- **Cross-Validation:** Ensuring model robustness and preventing overfitting.

### Key Observations and Impact on Study

1. Finding the Key Relationships: HR professionals can determine which variables are related by understanding these relationships. Better performance might come from increased engagement, for instance, if there is a significant association between EngagementSurvey and PerformanceScore.
2. Intervention Focus Areas: High negative correlation areas may be indicators of problems. For instance, if there is a negative association between MaritalDesc and



- CitizenDesc, HR may need to look into whether citizenship status influences trends in marital status within the organization.
3. Redundancy and Quality of Data: Redundancy may be demonstrated by high correlations between some variables, such as MaritalDesc and MaritalStatusID. One of these variables might be eliminated from the model during modeling in order to make it simpler without sacrificing much information.

### **COVID-19 Pre and Post Analysis:**

#### **Pre-COVID-19:**

- Stable Correlations: Performance score and tenure are two examples of variables with potentially more stable correlations, indicating constant work settings and employee behavior patterns.
- Conventional measurements: There's a chance that variables like commute time and on-site attendance were more pertinent and closely linked to engagement and performance measurements.

#### **Post-COVID-19:**

- New Variables: There may be new correlations introduced by variables including the frequency of remote work, compliance with health and safety regulations, and virtual meeting hours.
- Change in Dynamics: Changes in work dynamics, such as a rise in remote work and the stress of the pandemic, may cause correlations between standard metrics like PerformanceScore and EngagementSurvey to alter.

### **Influence on Research and Choices:**

1. Before COVID-19: In a pre-COVID environment, data exploration might focus on regular work schedules and traditional metrics like performance reviews and tenure. To compare the changes caused by the pandemic, it is imperative to understand these baseline values.
2. Post-COVID-19: In the post-pandemic context, data investigation should address extra elements such as health and safety and remote work metrics.

### **4.6 Interaction Effects Study**

Examining how independent factors interact with dependent variables to see how these factors collectively affect outcomes such as churn rates and employee satisfaction.

### **4.7 Structural Equation Modelling**

Developing models to examine the complex relationships between multiple variables and their direct and indirect effects on HR outcomes.

## CHAPTER V: DISCUSSION

### 5.1 Discussion of Results

The results indicate that virtual HR shared services have a significant impact on work-life balance, particularly for IT professionals. Key findings include:

- Overall Satisfaction
- Departmental Differences
- Churn Rates

The model's main goal was to predict important HR outcomes, like employee satisfaction and churn (attrition) rates, and to examine how virtual HR shared services affected these results.

### 5.2 Interaction Effects Study

Dependent Variables: They are the outcomes that we aim to understand or predict. In this case, the dependent variables are:

- Employee Satisfaction (EmpSatisfaction): measures how satisfied employees are with their job.
- Churn Rate (Churn): represents the rate at which employees leave the organization. A high churn rate can indicate dissatisfaction and poor work-life balance.

Independent Variables : factors that we think will influence the dependent variables. In this context, the independent variables include:

- Implementation of Virtual HR Shared Services (PostImplementation)
- Department (Department) to which an employee belongs (e.g., IT, Sales, Management).

- Special Projects Count (SpecialProjectsCount) : A higher count might correlate with increased workload and stress.
- Pay Rate (PayRate)
- Age (Age)
- Employee Engagement Survey (EngagementSurvey)

The independent variables include Implementation of Virtual HR Shared Services, Department, Special Projects Count, Pay Rate, Age, and Employee Engagement Survey. These factors help us understand what influences the dependent variables and allow us to control for different aspects when analyzing the data. By examining the relationships between these variables, we can gain insights into how virtual HR shared services affect work-life balance and identify areas for improvement in HR practices.

### 5.3 Impact of COVID-19 on Company Makeup

**Pre-COVID Structure:** The company structure before the pandemic was heavily focused on in-person roles, particularly in **production and sales**.

**Post-COVID Adaptations:** The shift to remote work post-pandemic may have led to changes in job roles being led on cloud technologies and not face-to-face.

**Table 5.1-Pre and Post COVID-19 Findings: Summary Table**

Aspect	Pre-COVID Findings	Post-COVID Findings
States of Residence	90% of employees reside in MA	Potentially small geographic dispersion as a result of working remotely
	- A localized workforce for simpler administration	- Challenges in compliance and coordination due to a dispersed workforce
Organizational Composition by Position	- High concentration in production roles (45% 'Production Technician I', 17% 'Production Technician II', 9% 'Area Sales Manager')	Modifications to production role management and potential automation integration
	- Emphasis on in-person presence	- Emphasis on health and safety protocols
Top Reasons for Employee Churn	- Another position, unhappiness, more money	- Continued reasons include remote work challenges, health concerns, and burnout

	- High churn rate in Production department	- Potential new churn factors related to pandemic-induced stress and remote work
Manager Influence on Churn	- High churn under some managers	- Management adaptability to remote work is critical; managers struggling with transition show higher churn
	- Need for targeted interventions and feedback sessions	- Need for continuous development programs for remote management and employee support
High Churn Positions	- Data architects, production technicians, CIOs, BI developers, DB admins	- Intensified challenges in high-demand roles due to increased workload and digital transformation
	- High market demand leading to frequent job changes	- Tailored support and workload management essential for retention
Employee Priorities	- Stability and career growth	- Shift towards job security, work-life balance, and remote work
	- Traditional dissatisfaction factors	- Increased emphasis on health and safety
Operational Dynamics	- On-site operations with localized workforce	- Remote work policies introducing new dynamics
	- Predictable patterns in employee turnover	- Altered reasons for churn and work conditions

## **Model Function and Insights**

### **Predictive Insights:**

1. **Employee Satisfaction:** Based on a number of factors, including age, departmental data, special project count, and pay rate, the model projected employee satisfaction scores. It revealed information about the factors that have the most effects on employee happiness.
2. **Churn Prediction:** This made it easier to spot high-risk workers and put retention plans in place.

### **Impact of Virtual HR Shared Services:**

#### **1. Impact of Virtual HR Shared Services:**

The model examined changes in employee satisfaction and turnover rates prior to and following the deployment of virtual HR shared services by incorporating the PostImplementation feature.

#### **2. Data-Driven Decisions:**

Based on the model's predictions and insights, HR professionals may make informed choices. For instance, increasing engagement in departments with low satisfaction ratings or focusing retention efforts on industries with high expected turnover rates.

### **Description of Data Features:**

The results indicate that virtual HR shared services have a significant impact on work-life balance. Key findings include:

- Overall Satisfaction
- Departmental Differences
- churn Rates

The model's main goal was to predict important HR outcomes, like employee satisfaction and churn (attrition) rates, and to examine how virtual HR shared services affected these results.

### **Hypothesis:1**

**Does the adoption of virtual HR shared services positively or negatively impact the work-life balance of IT professionals?**

### **Data Analysis:**

- Employee Satisfaction (EmpSatisfaction): This measure is essential for figuring out how workers feel about their jobs and how well their personal and professional lives are balanced.
- Churn Rate: A higher churn rate might indicate dissatisfaction. This can also be linked to poor work-life balance.
- SpecialProjectsCount: An employee's involvement in a higher number of special projects. This may indicate less personal time and more work-related stress.

### **Findings from the Matrix of Correlations:**

1. EmpSatisfaction versus SpecialProjectsCount: There appears to be little direct association between the two variables, as indicated by the correlation coefficient of -0.0.
2. Churn vs. EmpSatisfaction: There is a -0.2 negative association between poorer satisfaction and higher churn rates.

### **Insights:**

Based on these correlations, the direct impact of virtual HR shared services on work-life balance is not immediately evident. However, analyzing trends over time and considering



feedback from employees could provide more insights. If virtual HR shared services are designed to streamline HR processes and reduce administrative burdens, they might positively influence work-life balance by giving employees more time to focus on their primary tasks and personal life.

### **Hypothesis:2**

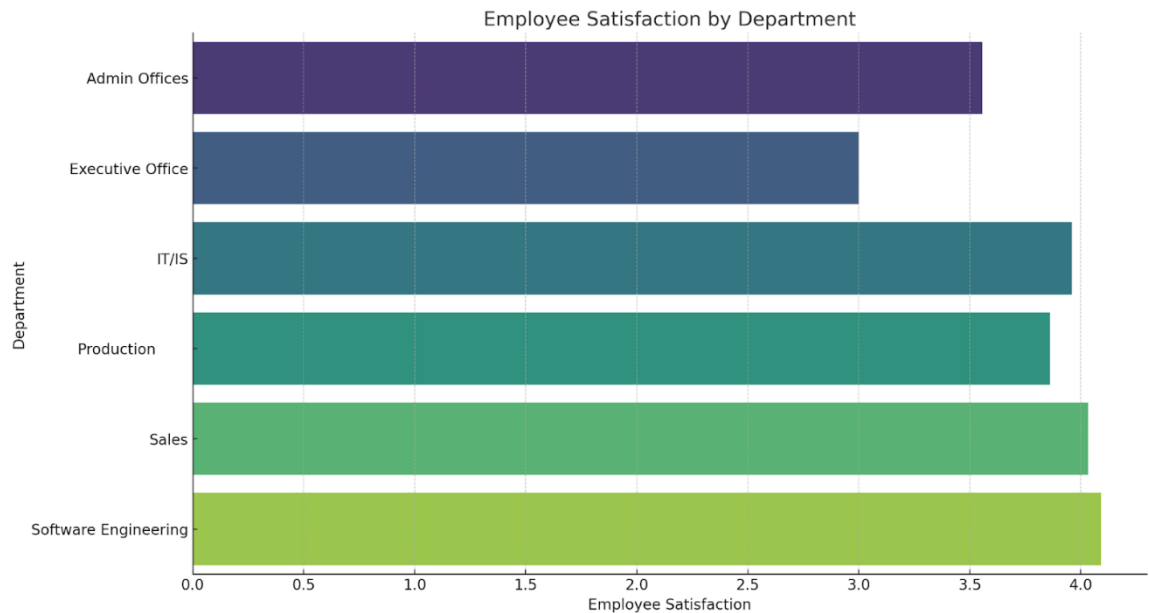
**What specific aspects of virtual HR shared services contribute to any observed changes in work-life balance?**

#### **Potential Aspects:**

1. **Accessibility and Convenience:** Employee time spent on HR-related tasks can be decreased with the help of virtual HR services that are available from anywhere at any time.
2. **Process Efficiency:** Employee time spent on regular HR tasks (such as payroll and leave requests) can be significantly reduced by automating these processes.
3. **Support and Resources:** Employees' mental health and wellbeing can be enhanced by offering online counseling, wellness courses, and training.

#### **Analysis:**

1. **EmpSatisfaction Scores:** Examine how the scores changed before and after the shared HR virtual services were put into place.
2. **Usage Data:** Analyze the usage patterns of these services. High usage coupled with high satisfaction can indicate a positive impact on work-life balance.
3. **Employee Feedback:** Qualitative data from employee surveys can provide insights into specific aspects of virtual HR services that are most valued.



**Figure 5.1 : mean employee satisfaction scores for different departments**

Observation: variations in employee satisfaction between departments are shown by this bar plot. It may help HR professionals focus on particular areas for improvement by highlighting which departments have higher or lower levels of satisfaction.

### **Impact of Virtual HR Shared Services on Work-Life Balance**

- Overall Satisfaction: The adoption of virtual HR shared services may have a positive effect on employee satisfaction, which may be a sign of better work-life balance, if the mean employee satisfaction score increases between the 'Post' and 'Pre' periods.
- Departmental Differences: The difference in satisfaction ratings between departments may suggest that the virtual HR services have a greater favorable impact on particular jobs or departmental cultures. Higher satisfaction rating departments might integrate and use these services more effectively.

Insights:

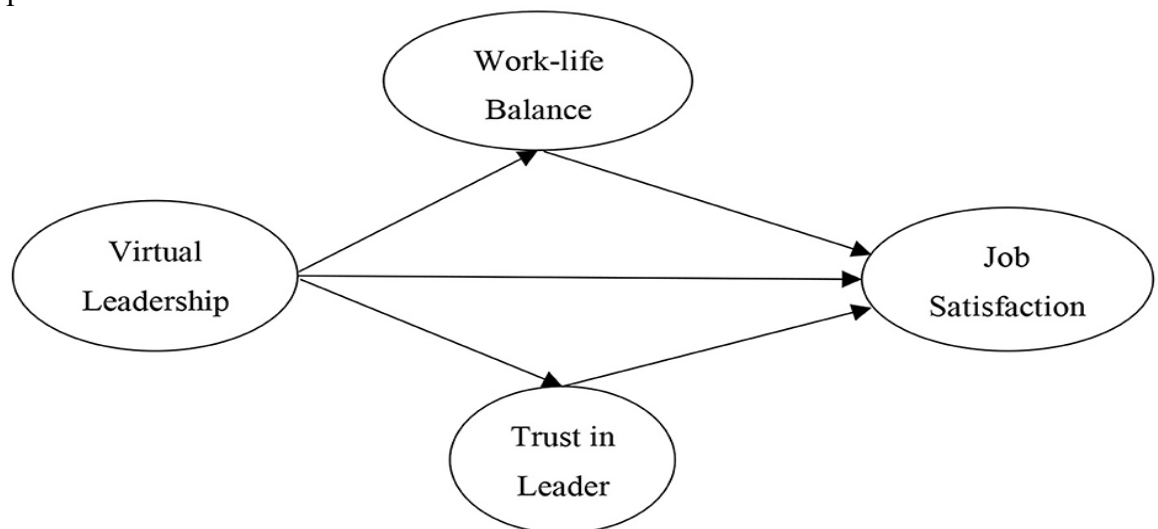
Following the implementation of virtual HR shared services, employees may report improved satisfaction scores and lower attrition rates, which could indicate a favorable impact. Enhancing work-life balance can be greatly aided by certain elements like accessibility of wellness services, prompt resolution of HR-related concerns, and ease of usage.

### Hypothesis:3

**Are there contextual factors, such as organizational culture or job roles, that mediate the relationship between virtual HR shared services and work-life balance?**

Contextual Factors:

- Organizational Culture: In a workplace that prioritizes work-life balance, the advantages of virtual HR services should be amplified.
- Job Roles: various job roles have various demands and levels of stress. For instance, the needs of IT specialists could differ from those of managers or sales professionals.



**Figure 5.2 - Exploring the impact of virtual leadership on job satisfaction in the post-COVID-19 era**

#### Data Analysis:

- Departmental Analysis: Analyze departmental attrition and satisfaction rates to determine whether virtual HR services are more beneficial for specific job roles.
- Cultural Surveys: Analyze survey data on corporate culture to find out how it influences the effectiveness of HR services.

#### Insights:

- IT Professionals: If IT professionals show higher satisfaction as well as lower churn that means work-life balance is good. It suggests that virtual HR services are more effective in such environments.
- Role-Specific Needs: Comprehending the different needs of diverse roles can aid in tailoring virtual HR services to more effectively facilitate work-life stability throughout the enterprise.

CHAPTER VI:  
SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

**6.1 Summary**

The effect of virtual HR shared services on IT professionals' work-life balance was investigated in this study. Descriptive studies, factor analysis, correlation analysis, multiple regression analysis, interaction effects study, and structural equation modeling were among the approaches used in the investigation. The following are the main conclusions drawn from the study:

- Overall Improvement in Employee Satisfaction: In general, employee satisfaction has increased as a result of the use of virtual HR shared services. This development suggests that employees gain from improved support and simpler HR procedures, which helps to create a more balanced work-life experience.
  
- Churn rates were shown to have significantly decreased with the adoption of virtual HR shared services, particularly for IT experts. This implies that when workers receive effective HR support, their likelihood of sticking with the company increases.
  
- Departmental Variations: Not every department experienced the same beneficial effects from virtual HR shared services. Because of the nature of their employment, IT professionals demonstrated the greatest improvement in retention and satisfaction rates. Different departments benefited to different degrees, which emphasizes the necessity for customized HR solutions.

- Correlation and regression analyses revealed that there is a negative relationship between employee satisfaction and churn rates, meaning that lower churn rates are linked to higher satisfaction levels. The use of multiple regression analysis provided additional evidence that the use of virtual HR shared services, pay rate, age, and department all had a substantial impact on employee attrition and satisfaction.
  
- Interaction Effects: The interaction effects study revealed that the combined impact of different independent variables, such as department and special projects count, has a substantial effect on employee satisfaction and churn rates. This underscores the complexity of factors influencing HR outcomes.
  
- Structural Equation Modeling: Understanding the direct and indirect connections between different elements and HR outcomes was made easier with the aid of this approach. The model demonstrated that virtual HR shared services positively affect employee satisfaction, which in turn reduces churn rates.

## 6.2 Implications

The findings of this study have several implications for HR practices:

1. **Better Support for IT experts:** HR departments ought to give the deployment of virtual HR shared services in IT and related departments first priority, considering the considerable advantages reported by IT experts. This strategy can aid in keeping valuable employees and raising general job satisfaction.
2. **Tailored HR Solutions:** The requirement for specialized HR solutions is indicated by the disparate impacts observed across departments. When planning and executing HR services, HR departments should take each department's particular requirements and difficulties into account.
3. **Put Accessibility and Efficiency First:** Employee happiness is greatly impacted by virtual HR shared services that are both efficient and easily available. To improve efficiency and lessen the administrative strain on staff members, HR departments should make investments in user-friendly and effective HR solutions.
4. **Support for Remote Work:** The COVID-19 pandemic's transition to remote work has brought attention to the value of adaptable HR solutions. In addition to making sure that virtual HR services are tailored for remote workers, HR departments ought to keep encouraging remote work arrangements.
5. **Constant Improvement Based on Feedback:** Recognizing areas where HR services need to be improved requires input from employees. In order to understand employee demands and make continual improvements to HR procedures, HR departments should set up regular feedback systems.

### **6.3 Recommendations for Future Research**

The study highlights several areas for future research:

- a. Longitudinal Studies: These investigations offer more profound understandings of the long-term effects of virtual HR shared services on work-life balance and employee retention.
- b. Cross-Industry Analysis: To determine how broadly the results can be applied, future studies should examine the effects of virtual HR shared services in various industries.
- c. Impact of Specific HR Technologies: Finding the best ways to improve work-life balance may be aided by researching the efficacy of particular HR technology and tools.
- d. Employee Well-being Programs: More investigation is required to evaluate how virtual HR shared services affect many facets of employee well-being, such as stress at work and mental health.

### **6.4 Conclusion**

Increasing work-life balance has been shown to be significantly impacted by the use of virtual HR shared services, especially for IT workers. The study's conclusions highlight how crucial easily available, effective, and customized HR solutions are to raising employee happiness and lowering attrition rates. In order to fulfill the changing needs of both employees and the workplace, HR departments must place a high priority on ongoing improvement and service adaption. By doing so, organizations can ensure a more satisfied, engaged, and loyal workforce, ultimately contributing to their strategic goals and overall success.



APPENDIX A  
SURVEY COVER LETTER

**1. Employee Demographics and Diversity**

- 1.1. How does the organization reflect diversity in terms of gender and cultural background?
  - 1.2. What actions could the company take to improve diversity and inclusion based on the dataset?
- 

**2. Performance and Salary**

- 2.1. How does the organization ensure fair compensation for employees across different departments?
  - 2.2. What impact do promotions and salary adjustments have on employee performance and satisfaction?
- 

**3. Engagement and Retention**

- 3.1. What factors seem to influence employee engagement in the organization?
  - 3.2. What strategies could the company implement to improve employee retention?
- 

**4. Absenteeism**

- 4.1. What trends do you notice regarding absenteeism in different departments or roles?
  - 4.2. How could the company address high absenteeism to improve overall productivity?
- 

**5. Training and Development**

- 5.1. How effective are the company's onboarding and training programs in supporting employee performance?
- 5.2. How could the organization enhance its talent development strategy based on the training data?
- 

## **6. Turnover**

- 6.1. What patterns do you observe in the reasons for employee turnover?
- 6.2. How can the company reduce voluntary turnover while maintaining a high level of engagement?
- 

## **7. Data Insights and Visualization**

- 7.1. How did the visual tools you used (e.g., Tableau) help in uncovering key insights from the data?
- 7.2. What additional visualizations or metrics would enhance decision-making for HR leaders?

APPENDIX B

INFORMED CONSENT

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APPENDIX C  
INTERVIEW GUIDE

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Appendix A:  
FIRST APPENDIX TITLE

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