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HUMAN RESOURCE INFORMATION SYSTEMS: IMPLEMENTING DATA ANALYTICS TECHNIQUES IN HUMAN RESOURCE FUNCTIONS

Prachi Tembhekar

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IMPLEMENTING DATA ANALYTICS TECHNIQUES IN HUMAN RESOURCE

FUNCTIONS

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A Project

Presented to the

Faculty of

California State University,

San Bernardino

_____

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

in

Information Systems and Technology

_____

by

Prachi Tembhekar

December 2021

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ABSTRACT

This project investigated analytical techniques used by organizations across many industries for HR functions, and how data analytical techniques can help HR departments work efficiently. The goal was to look into the obstacles and opportunities that companies have when using HR analytics as a tool in their businesses. This project used secondary data acquired from earlier research articles, journals from the years 2016 to 2019, blogs, and websites to investigate theories and applications of HR analytics. It also examined the need of analytics to assist HR leaders in thinking about the implications of these technologies in future work and how data analytics will shape the HR system in the future. The project examined the implementation of different AI and Data Analytics techniques - Predictive, Perspective, Descriptive and Diagnostic analytics that are already in use by organizations to maximize efficiency in the HR department. The project also uncovered the following important issues faced by the organizations: lack of technical skills, cost required for training, and provided possible solutions by using data analytical techniques.

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CHAPTER ONE:

PROJECT BACKGROUND

Introduction

Rather than undertaking everlasting polls or evaluating employees to

determine their commitment or career progression, new big data-driven

methodologies can provide valuable benchmarks as well as provide beneficial

information and insight based on existing data, as opposed to leisure pursuits,

which rely solely on simple research studies and psychologist reviews (Kumar,

2020). Data science is frequently used to gather, process, and share information

about a candidate's abilities and understanding. To gather this information, a

variety of sources are used such as social networking websites, polls, and some

internet communities (Kampakis, 2021).

Multiple techniques based on data processing could accurately assess

pooled data and rework it into important insights about a candidate's

professionalism and preferences (Bhuyian, 2020). To individuals who are new to

these techniques and processes of talent acquisition, hiring a specialist may

appear to be a simple task. Indeed, this problem could be time-consuming and

costly, requiring a large amount of the company's resources (Zavgorodniy, 2019).

Regardless, HR managers are on top of the hiring process; all the

managers responsible for hiring create plans that will help the department in

contacting a large number of suitable candidates and making sure they'll have a

friendly and welcoming environment that will encourage these candidates to stay

on the team for a long time (Zavgorodniy, 2019). While analytics will not be able

to solve every HR problem, they will help professional HR managers construct

plans that optimize talent investments while successfully (Kumar, 2020)

managing recruiting, development, engagement, productivity, accountability,

retention, and a variety of other workplace operations (Kumar, 2020).

It's crucial to start basic and figure out 'what happened' and 'why it

happened' for maximum commercial impact. HR analytics can be quite beneficial

to businesses (Kumar, 2020). To take advantage of this power and reap the

benefits, one must:

- Be inventive when it comes to locating fresh intelligence sources.
- Start with descriptive insights and use the entire analytics toolset.
- To drive initiatives, put the business context and strategy in the centre.

HR analytics uses mathematical models, statistical models and the results

help in analyzing factors that are related to the organization's employee and will

improve overall performance (Kumar, 2020). HR analytics has been discussed by

numerous academics for many years. Many articles have been written that

emphasize on the fundamental element of HR analytics, the history,

contemporary, and long-term vision of HR analytics, the adoption of HR analytics

in enterprises, the amount of its efficacy, the emergence of HRIS, and many other research publications (Kumar, 2020).

There are several ways in which data analytics is already being employed to enhance the worker experience (Kumar, 2020). As these solutions become further embedded, and as new technologies are developed, this is often set to extend (Kumar, 2020). Human resource analytics is a relatively new intervention in the broader subject of human resource management, and it involves the application of statistical tools, measurements, including methodologies to use it and mask the most effective judgments, such as HRM strategies and practices (Mohammed, 2020). People analytics, talent analytics, and workforce analytics (Mohammed, 2020) are all terms used to describe this type of analysis (Mohammed, 2020).

HR analytics is more dependable since it gives scientifically reliable information and statistics that can be utilized to build new HR strategies and certain other policies, and thus to execute current Organizational measures and procedures (Mohammed, 2020). Employers and organizations have recognized the possibilities for HRM given by analytics, but there is still a lot of room for growth in the sector and research into the applicability of analytics within the many categories that fall under HRM (Mohammed, 2020).

Organizations have been using IT in their day-to-day functions to achieve efficiency in the HR department (Mohammed, 2020). This aids HR personnel in

comprehending the importance of technology in their roles and in gaining a

comprehensive picture of the HR department's evolution (Kumar, 2020). The

latest revolution in HRIS automates and streamlines routine administrative and

compliance operations that were formerly undertaken by HR departments,

allowing HR to be outsourced more easily (Kumar, 2020).

HR Analytics has a number of advantages for businesses since it

estimates labor needs, allows HR to achieve organizational objectives, and

improves firm productivity, that all lead to positive outcomes (Kumar, 2020).

Despite its success, the organization confronts numerous obstacles in deploying

and using the HR Analytics tool in the workplace, including data governance,

employee skill shortages, top management support, and a range of other

concerns (Mohammed, 2020).

Problem Statement

This project attempted to investigate the importance of Data Analytics and People Analytics to improve efficiency in HR functions. "Due to useful analytics results regarding how organizations find, hire, maintain, and retain employees, HR data analysis plays a significant role in operational activities of any business. How can data analytics help HR departments work more efficiently?" (Zavgorodniy, 2019)

Research Questions

There are two main questions that will be discussed in this project:

1. What techniques have made an impact on HR functions in the last five years?

2. How can Data Analytics and Artificial Intelligence tools help to improve analytics in HR functions?

CHAPTER TWO:

LITERATURE REVIEW

About Human Resource Analytics

Data analytics is an effective tool for gaining a deeper understanding of employees and their levels of engagement (Kumar, 2020). It has the ability to change the scope and length of the HR function (Kumar, 2020). It can be used to reduce hiring bias, strengthen employee relationships, identify performance drivers, and control attrition (Kumar, 2020). Many organizations are considering analytics to be important and the way it is impacting the operation handling within an organization (Kumar, 2020). According to an HR Manager in Deloitte, to make quick decisions supported by the data collected over the years and to understand the risks, the HR departments are considering the effectiveness of proper analytics (Kumar, 2020).

Organizations struggle to choose the right tool when embarking on analytics initiatives (Kumar, 2020). To optimize tool selection, it's generally a classic case of analysis-paralysis. HR analytics, like any other use of information science, is all about how you approach the problem. As far as computer power goes, the algorithms require the most context possible (Bhuyian, 2020). Start with all accessible factors when creating a model to forecast staff attrition, for example. The list must next be properly pruned by looking at the relevancy and relationships. For data to become information, it must be contextualized,

categorized, computed, and condensed, according to Davenport & Prusak (2000) (Juneja, 2020).

People analytics, workforce analytics, and talent analytics (Kumar, 2020) are all types of HR analytics that help with a variety of HR operations by automating and making them more cost-effective over time (Kumar, 2020). Data sharing is necessary in a variety of functional areas as well as at many levels of management, particularly in the Human Resource Department (Kumar, 2020). The degree of management can be split into three major categories (Juneja, 2020): Top Level, Middle Level, and Lower Level management (Juneja, 2020). Users at various levels, which can be generically defined as operations, middle management, and executive, complete data sharing (Juneja, 2020).

In today's volatile market situation, people are an organization's most precious asset and the most effective way of attaining a competitive edge yet managing people with various competencies and aligning their outputs with the organization's plan is a huge difficulty (Mohammed, 2020). Massive volumes of data must be created, analyzed, and stored in order for decision-making to be possible (Mohammed, 2020). Human resource management demands technologies that allow managers to obtain insights into patterns that arise from a variety of HR operations, enabling companies in finding star performers from a big employee database (Mohammed, 2020).

Human Resource Analytics Process

HR analysts employ a variety of data analysis models, Business Intelligence Tools, and Data Warehousing techniques to gather information that will be valuable in the future of the company (Kumar, 2020). Data analytics technologies, which aid in the creation of reports, visualization tools, and dashboards, can provide a greater understanding of HR activities and operations. Data collecting, data purification, data analysis, plan evaluation, plan execution, and plan streamlining are some of these functions (Kumar, 2020).
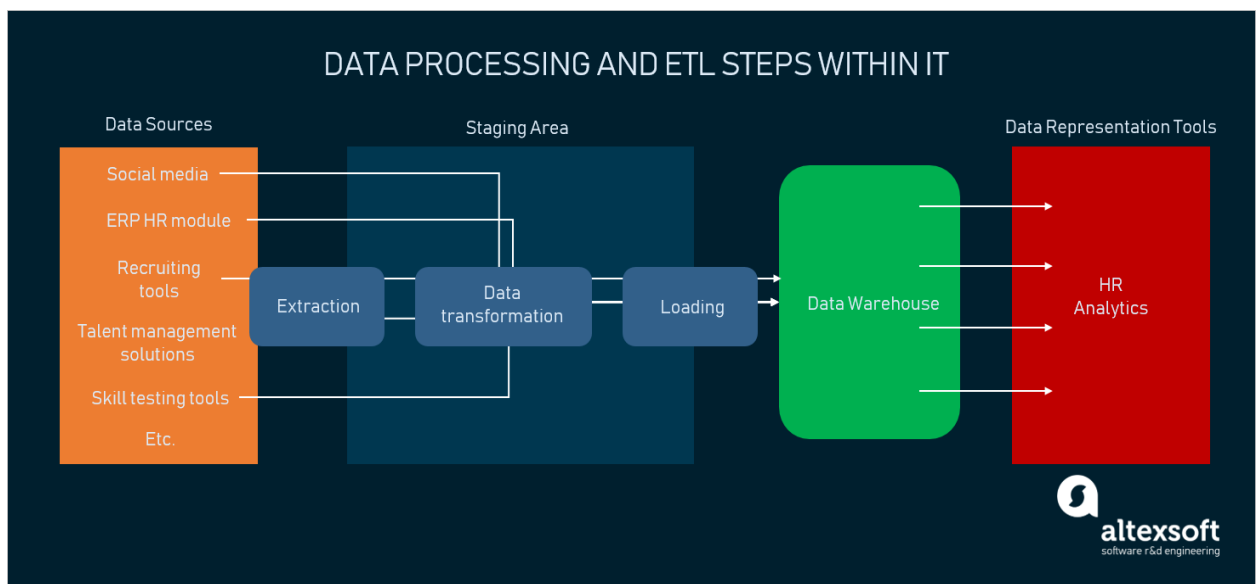
Figure 1: Overview of HR Analytics Process (AltexSoft, 2019)

Steps Involved in Human Resource Analytics

Metrics to Monitor and Predict:

It's difficult enough to choose indications and KPIs for HR systems with predictive capabilities. To forecast outputs, "machine learning models take into account problem attributes called features" (future events or values) (AltexSoft, 2019). Specialists must choose important features for the model's training in order to construct a model that can predict outcomes with the required accuracy. As a result, you must assess the collection of elements that may lead to a specific (good or negative) future occurrence that you wish to forecast (AltexSoft, 2019).

Some of the sources of data source collection are -

- Social Media
- Skill Testing Tools
- Recruiting sites
- Talent Management Tools

Data Transformation Stage:

Employee data is frequently dispersed among multiple HR systems, Excel spreadsheets, and paper files. Accessing data from many systems is inefficient and time-consuming (AltexSoft, 2019). To ensure data accuracy, it is necessary to have a single source of information (centralized data repository). Once you've

gathered all employee information, you may create key performance metrics to help you better understand how employee major factors that determine to corporate objectives (AltexSoft, 2019).

Data integration technologies transfer information from several systems into a warehouse. "ETL (extract, transform, load)" is one of the methods for doing this task (AltexSoft, 2019). The ETL procedure is divided into three stages:

- Extract - Connecting to information sources and retrieving it is known as extraction.
- Transform - this is the process of taking raw data and formatting it according to a set of rules. When data is placed in a temporary storage - staging area, it is altered.
- Loading - converted data into the warehouse, where it may be searched and used for combination visualizations and prediction (at the descriptive analytics level) (predictive level) (AltexSoft, 2019).

Setting Up Data Infrastructure:

Large amounts of structured data are consolidated, stored, and analyzed in the data warehouse. It's not uncommon for a company to have several departments, each of which deals with data with distinct features (AltexSoft, 2019). "To simplify and speed up data queries, the data warehouse might be divided into smaller components — data marts – in this scenario" (AltexSoft, 2019). Data warehouses differ from operational databases in that they focus on

aggregating data from several periods rather than updating large volumes of data in real time (AltexSoft, 2019).

<u>Building a Data Model:</u>

Data analytics examine a data warehouse to see if it includes the information needed to solve a given problem. If there isn't enough information, they start collecting more. The experts begin model training after preparing data for machine learning (AltexSoft, 2019). To predict known attributes in new information, you can utilize data with mapping variables (also known as labels), and this "model training approach is known as supervised learning" (AltexSoft, 2019). The suggested method will eventually learn how to discover patterns in the dataset that link data frame properties to the correct response, resulting in a "machine learning algorithm" that can identify these similarities in updated data (AltexSoft, 2019).

During unsupervised learning, data without mapping answers is used to train (AltexSoft, 2019). After applying the HR use cases, employees can be grouped based on their similarities or differences by identifying hidden patterns in their data, such as setting the criteria that determines who is a high or low performer (AltexSoft, 2019).

Accessing HR Analytics:

This step's main purpose is to create a front-end solution that allows corporate customers without a background in data science and analytics or big data to change information and develop custom reports using a drag-and-drop interface: critical components and combine datasets for analysis (AltexSoft, 2019).

The following are examples of nice-to-have features:

- There are two types of dashboards: "static and dynamic (interactive)". The latter is data-driven and allows users to delve down into the data visualization.
- A large number of charts are available.
- The ability to build custom reports on the fly
- Dashboards that can be shared
- Uploading custom graphics is a possibility.

To speed up development, libraries for data visualization are always an option (AltexSoft, 2019).

Benefits of Human Resource Analytics

HR analysis is transforming the ways that HR brings to the company. This could be because the selection process wasn't streamlined earlier, and there wasn't a lot of facts to back up those selections. However, with proper analytics, things are constantly changing on the work front (Kumar, 2020). A good deal of knowledge is employed to collect insights then get wont to an equivalent insight to achieve a stronger strategic read of operational functions (Kumar, 2020). Therefore, human resource analysis focuses on maintaining strategic and operational potency by constructing new human-oriented views and concepts (Kumar, 2020). Time unit analytics isn't concerning assumptions and theoretical coming up with but is based on knowledge and is a lot of a come-on investment (Kumar, 2020).

Higher automation of HR functions saves time and energy of the organization. The HR departments have gotten better in their hiring and achievement practices after implying HR analytics (Bobriakov, 2020). The speed of retention is more increased as a result of plans and techniques aren't simply profit-orientated however people-orientated moreover (Bobriakov, 2020). The human resource method is more efficient and improves and workforce, with the assistance of upper analytics, in less time and in an exceedingly more productive way, the employees will perform their tasks (Bobriakov, 2020).

Workers' overall expertise is improved, which makes them happier and more satisfied with their occupations. For in-house training & development, better talent development is considered (Kumar, 2020). Employers and organizations have acknowledged the benefits of analytics for HRM, but there is still a lot of potential for expansion and research into the importance of analysis in the various categories that make up Human Resource Management (Kumar, 2020). When conducting HR functions such as projections demand and supply of people, targeting specific employment tests to accommodate applicant profiles, reviewing employee training and development needs, implementing pay for performance, and ensuring appropriate performance information to measure on bonuses and improve workplace restraint, HR managers will prove to be valuable to HR analytics (Mohammed, 2020).

Development of Human Resource Analytics

Over the years, the demand of technology has increased tremendously – "to process employee information effectively and efficiently" (Bhuyian, 2020). This gave the IT vendors an opportunity to assist HR departments to meet their requirements to build an appropriate system including hardware and software (Bhuyian, 2020). With the evolving technology, it became easier for organizations to meet their technical needs and to get a cost-effective output (Bhuyian, 2020).

These technological advancements made it easier for HR departments to become familiar with the Information System and use it in their daily operations (Bhuyian, 2020). HRIS has progressed from simple recording and reporting to sophisticated analytical tools to aid decision-making (Bhuyian, 2020). Recruitment, perks management, time management, payroll, compensation management, and performance management have all benefited from HRIS (Bhuyian, 2020).

Business intelligence vendors include SAP, IBM, Oracle, and Microsoft provide data analytics capabilities (Mohammed, 2020). Python is chosen by data scientists for statistical data analysis and visualization (Mohammed, 2020). R-Studio is a data analysis and visualization software package that can handle very big data sets (Mohammed, 2020). Microsoft Excel has long been a popular data analysis application for gathering, analyzing, and transforming data (Mohammed, 2020). Microsoft Power Business Intelligence software can gather data from a variety of sources and makes data analysis, aggregation, and visualization a breeze (Mohammed, 2020).

Businesses have amassed a huge quantities of data in each operation as they have evolved worldwide (Gaur, 2021). All of the company's activities use analytics, but HR has lagged behind, forcing the establishment of HR analytics owing to the complexity in obtaining and evaluating HR data (Gaur, 2021). HR analytics has gained considerable pace ever since, although it is still in its early stages (Gaur, 2021). HR analytics research has only recently begun, with an emphasis on HR analytics as a decision support tool, instrument proficiency, and HR analytics expertise (Gaur, 2021).

Methodology

Research

I was motivated to research about Human Resource Information Systems after coming across the Oracle HCM Cloud, developed by Oracle Corporation in 2011. To research about the system in depth, I used the Google Search engine

and used keywords like - HR analytics, Data Science application in HR, Evolution of Artificial Intelligence in HR. Also, I limited my research to articles published from the year 2015 to 2021.

I referred to a few papers published that I found while searching for the evolution of HRIS. With the help of these papers, I understood the historical evolution of HRIS and the interface between HR and Computer Technology.

The primary source of the literature was published papers on Academia.com and Google scholar. Few keywords related to Data analytics, people and workforce analytics, and HR functions were used to get appropriate results. The secondary sources of data were few articles and blogs posted on reputed websites that included certain workflow diagrams explaining the implementation of Data Analytics in HR.

CHAPTER THREE:

APPLICATIONS

Data Analytics Application in Human Resource Information Systems

When it comes to running a successful business, the most precious asset is undoubtedly the people working there. Data analytics is rapidly being used by human resource management teams to enhance evidence-based decision-making (Kampakis, 2021). HR practitioners also have far more data to help influence these judgments thanks to advances in Artificial intelligence and machine learning (Kampakis, 2021). While data analytics and internet analytics play an important role in the recruiting process for many companies, a rising number are using increasing complexity HR metrics to make data-driven people decisions that will affect employees throughout their careers (Kampakis, 2021).

As Deloitte reported in 2017, "71% of companies said they considered people analytics a high priority for his or her organization with 31% rating it - very important" (Bobriakov, 2020). Promotions, wage rates, turnover and maintenance, and skills development, for example, are now more data-driven decisions informed by artificial intelligence-powered analytics (Zavgorodniy, 2019). The fact that those Machine learning indicators will be collected and analyzed accordingly to aid in-the-moment determinations is a critical value differentiation (Zavgorodniy, 2019).

By evaluating existing data and utilizing statistical data analysis,

simulation, machine learning, data mining, and AI (Artificial Intelligence) to

forecast potential data, "predictive analytics" is used to make forecasts about

unforeseen events (Mohammed, 2020). "Predictive analysis" is a rapidly growing

and in-demand field in human resources. HR statistical methods is used by HR

managers in businesses to predict individual interactions, maximize performance,

and give a better value for money for businesses by utilizing predictive analysis

techniques (Mohammed, 2020).

Five Ways to Apply Data Analytics

To understand the applications of Data Analytics techniques, I have

examined how these techniques can be used in HR functions and how it can

enhance the performance of HR management teams. Here are five ways HR and

talent management teams are applying data analytics to cultivate employee

development and make high-performing organizations (MSU, 2020).

Measuring Performance:

Organizations can use analytics technologies to determine employee

performance benchmarks, so train current and new employees to understand

those attributes and how they affect them (MSU, 2020). "Deloitte, along with

other firms, analyzes human performance data, travel data, and billing hours to

help people improve their professional performance while also improving their

health and vitality" (MSU, 2020). Data acquired from top-performing departments

or specific individuals can also be used by organizations to better understand effective processes and set standard criteria for other groups within the firm to follow (MSU, 2020).

Informing Promotion and Salary Decisions:

Observing under-performing coworkers earn promotions is a big demotivator for many high-performing individuals. There are various reasons that contribute to this, but human bias and nepotism are frequently involved (MSU, 2020). Using a data-driven approach can assist organizational leaders in tracking the rate at which individuals are promoted and raised, as well as the major factors that influence these decisions (MSU, 2020). A substitute employee, for example, may have just performed an outstanding sales performance, but a longer-tenured colleague may have routinely supplied exceptional performance over time (MSU, 2020). Process of collecting and analyzing new types and data collection techniques, as well as using it to train AI algorithms, can help managers make fewer biased strategy and evaluate that performance-generated data is a bigger part of the picture (MSU, 2020).

Understanding Attrition and Increasing Retention:

"Performance-based analytics" may be used to anticipate which employees are more likely to depart while also providing insight into the variables that contribute to attrition (MSU, 2020). According to McKinsey & Co., a service industry consulting organization, money may be less of a factor than the quality

of managers and supervisors. "McKinsey references a case study of a major U.S. insurance corporation that introduced an incentive scheme in an attempt to retain staff but found little success," according to McKinsey (MSU, 2020). The company then started using data analytics to identify at-risk employees, and they discovered a pattern: "people who worked on smaller teams, waited longer for advancements, and reported to low-performing managers were much more likely to leave" (MSU, 2020). Rather than investing in these individuals, the company began focusing its efforts on developing stronger managers (MSU, 2020).

Organizations could also use information about employee turnover "(voluntary and involuntary attrition divided by average headcount)" (MSU, 2020) to identify trends and respond to unexpected spikes. An increase in involuntary attrition, for example, is a sign that the recruitment and selecting process needs to be reviewed; an increase in voluntary attrition, on the other hand, may necessitate deeper dives into individual departments or managers (MSU, 2020).

Examining Employee Engagement:

Performance management is a critical statistic for any HR department. Performance management surveys, such as those conducted by Gallup, are commonly used to collect this information (MSU, 2020). However, many companies are realizing the value of bringing this all in to their HR departments, including both rapid performance and to retain control over their employees' data

(MSU, 2020). In-house HR teams can use brief, tiny surveys to periodically monitor engagement and acquire quick information findings through the use of AI tools, rather of the lengthy questionnaires that many employees detest (MSU, 2020).

Gamification is another method that may be used to create a positive work environment while also providing additional data. "GamEffective," a startup that creates gamification software for enterprises, has one version in which employees may wager on how their day will go depending on their daily goals (MSU, 2020). Because employers may choose specific KPIs to measure within the app, this can enhance not only employee satisfaction but also inspire them to achieve their personal and organizational goals (MSU, 2020).

Measuring Employee Development and Learning Outcomes:

Organizations can profit from a robust training program by having a more productive team and greater retention (MSU, 2020). Organizations can shift their attention from contentment with the instruction to understanding of the program, monitoring the employee's actual development during the instruction, rather than asking a few static questions at the end of the learning process (MSU, 2020). Companies can take it a step further by using predictive analytics to personalize training content to better suit employee personal learning styles. Predictive analytics can be used at the institutional level to identify training gaps. Finally,

this data may be used to identify trends that make a training successful and point

firms in the proper direction for content improvements (MSU, 2020).

In-Depth Application of Data Analytics

Data Analytics application in HR functions focuses on providing efficient

and accurate decision making ability. To understand in-depth applications, four

HR management functions related to current employees in an organization are

taken into consideration.

Retention: Low speed turnover, and departing employees within their early

stages of their recruitments are the largest problem faced by the organizations.

This becomes a reason for declining performance and overall growth in an

organization (Kumar, 2020). Considering the variable costs like recruitment,

training and lost productivity, the recruiting expenses in an organization tend to

increase. Therefore, extending the retention rate of the workers is a necessity.

The retention rate is increased by effective churn analysis with the help of HR

analytics (Kumar, 2020). This helps in strategizing better and impactful data that

could provide with new policies, training programs, and identify risks in a better

way (Kumar, 2020).

Employee Performance: It is extremely important to understand employee

performance to obtain a better employee evaluation report with the help of

analytics (Kumar, 2020). To retain qualified and experienced employees, and

also to supply better employee growth, better HR analytics plays an important role within an organization (Kumar, 2020).

To help with finding successful performers and employees who are not meeting their goals, looking for an average employment length, and motivating factors, analytics is implemented within the organization (Kumar, 2020). This can help to motivate them to improve performance, decide career progressions, boost employee satisfaction, and find leadership qualities (Kumar, 2020). This allows the organization to understand employee performance to enhance the organization's ROI and also find potential leaders (Kumar, 2020).

Compensation: To decide employee efficiency and overall trade expenses, it is very important to take under consideration some of the factors affecting the organization and this is the foremost important decision that the HR department and the organization has to make (Kumar, 2020). To analyze various kinds of data like market data, tracking competitors' compensation styles, staff's demands, the exit survey contents, reason for offers getting declined, etc. HR analytics can play an important role in this (Kumar, 2020). To make a better plan for compensation and remunerations of employees, these things allow the corporation which is financially feasible and also keeps the employees happy (Kumar, 2020).

Training And Development: Many businesses face the problem of a skill gap. Such employees are not skilled enough to handle various duties that comes

with the job. In-house training is required as there's always an absence of proper skills in entry-level jobs (Kumar, 2020).

To comprehend the training strategy, information about the employees and their skill levels is acquired (Kumar, 2020). Analytics is employed in this scenario to assist with allocating resources to the appropriate location for training the personnel, as well as analyzing the development process (Kumar, 2020). This enables businesses to make their staff more qualified and skilled, which improves corporate performance and gives them a competitive advantage.

Points Taken in Consideration

The foremost function of HR is to look for the correct candidate for a specific job or position. It's easier said than done, seeking the perfect candidate could be a lot of work and may require better planning. Considering knowledge obtained by the organization like current market data, skills, previous hiring strategies and performance rates, etc., requires a lot of research (Zavgorodniy, 2019).

Talent can be found in a variety of places, including consultancies, colleges, direct sources, and referrals. Talent acquisition is employed when there is a desire to locate suitable candidates with the required experience, abilities, and academic qualifications. HR analytics aids in the sorting and presentation of data in a clear and understandable manner. Predictive analytics is utilized to get a better sense of who the best candidate is (Zavgorodniy, 2019).

CHAPTER FOUR:

IMPLEMENTATION EXAMPLES

In this chapter, the four models of Data Analytics and its implementations in HR Analytics will be discussed. These Analytical in the world of Data, and HR analytics take full advantage while implementing them in all the HR functions -

Prescriptive Analytics: It is already being used by digital disruptors like Netflix and Spotify in the media and entertainment industry (Zavgorodniy, 2019). The technology analyzes large amounts of consumer data and examines previous usage patterns in order to forecast future demands and preferences (Zavgorodniy, 2019). The prescriptive layer then steps in to advise which recommendations should be shown, how a specific campaign should be modified, and whether any unique messaging should be used to engage the user (Zavgorodniy, 2019).

Predictive Analytics: Human Resources has a lot of data on people, which is usually recorded in a "Human Resources Information System" (Zavgorodniy, 2019). By integrating predictive analysis to this data, HR could become a strategic ally who relies on validated and data-driven predictive models rather than gut intuition and soft science. HR predictive analytics enables HR to anticipate the impact of the change on employee happiness, satisfaction, and bottom-line performance (Zavgorodniy, 2019).

Descriptive Analytics: It's the most basic and widely utilized sort of

analytics; it's what's used to build the KPIs and metrics that show up in business

reports and dashboards (Zavgorodniy, 2019). Descriptive analytics helps firms

comprehend what has happened so far by summarizing and discovering trends

in current and historical data (Zavgorodniy, 2019). However, it makes no attempt

to explain why something happened or to predict what might happen in the

future. To address these difficulties, companies must combine descriptive

analytics with extra analysis methods (Zavgorodniy, 2019).

Diagnostic Analytics: In diagnostic analytics, common tactics include

- data discovery, drill-down, data mining, and correlations (Zavgorodniy, 2019).

During the discovery phase, analysts select data sources that will assist them in

analyzing the results. Drilling down means focusing on a certain feature of the

data or a particular widget (Zavgorodniy, 2019). Data mining is a process for

extracting information from vast amounts of unstructured data that is done

automatically. Finding consistent correlations in your data can also help you

narrow down the area of your investigation (Zavgorodniy, 2019).

Here is a figure describing analytics used;

Approach to data	Mode	Benefits
AI / ML models, Optimization, Scenario planning, Data driven decision making	PRESCRIPTIVE — What to do?	Data products, data validated actions, higher rate of success of strategic initiatives
Statistical Analysis, Segmentation, Decision Trees, Cause-effect modeling	PREDICTIVE — What will happen?	Support for strategic initiatives, forward looking decision making
Causal Analysis, Benchmarking and multi-dimensional analysis	DIAGNOSTIC — Why is it happening?	Improvements from status quo, data backed management
Operational Reporting for efficiency and compliance	DESCRIPTIVE — What's happening?	Process gap identification, data culture
	ANALYTICS – BAG OF TRICKS	Gramener

Figure 2:Types of Analytics and its Benefits (Zavgorodniy, 2019)

Human Resource Information Systems for Banking System:

"Consider the instance of a large retail bank that needed to develop a churn model to manage employee turnover (Bobriakov, 2020). While a decision tree was more understandable, logistic regression had a higher accuracy. Given the need for explainability, we encouraged the bank to stay away from black-box models" (Bobriakov, 2020).

The answer was made actionable by providing each element along with the probability of an attrition discount. Involvement in CSR (Bobriakov, 2020) activities is clearly one of the top-most influencers of attrition, as seen in the table below. This varies by industry, with 'Preferred Banking' having the greatest impact (Bobriakov, 2020).

Business Segments	CSR Activities	Rating	Grade	Org Unit	Age group	Source	Shares held	Education
Bank Operations	66%	73%	95%	29%	35%	46%	30%	27%
Branch & Sales	79%	37%	28%	31%	16%	7%	29%	3%
Customer Service	69%	51%	56%	39%	36%	10%	43%	9%
SME lending	51%	63%	5%	43%	29%	37%	29%	7%
Retail Lending	54%	64%	67%	25%	28%	29%	19%	19%
Retail Banking	75%	71%	70%	26%	45%	31%	12%	17%
Agriculture	30%	77%	59%	26%	26%	43%	5%	17%
Premium Accounts	12%	12%	11%	14%	4%	9%	6%	12%
Microbanking	25%	31%	43%	29%	15%	19%	23%	14%
Preferred Banking	85%	30%	63%	21%	3%	35%	6%	11%
Risk Management	27%	35%	49%	18%	15%	10%	6%	27%
Corporate Office	30%	37%	60%	0%	15%	5%	5%	13%
Business Banking	34%	64%	53%	9%	31%	14%	23%	7%
Total	56%	53%	51%	29%	25%	25%	23%	14%

Premium Accounts attrition is driven by other parameters

CSR Activities, Rating and Grade are the top three influencers of attrition

Age is not a very big driver

Education makes little difference

But CSR affects only some business segments strongly. Other are limited

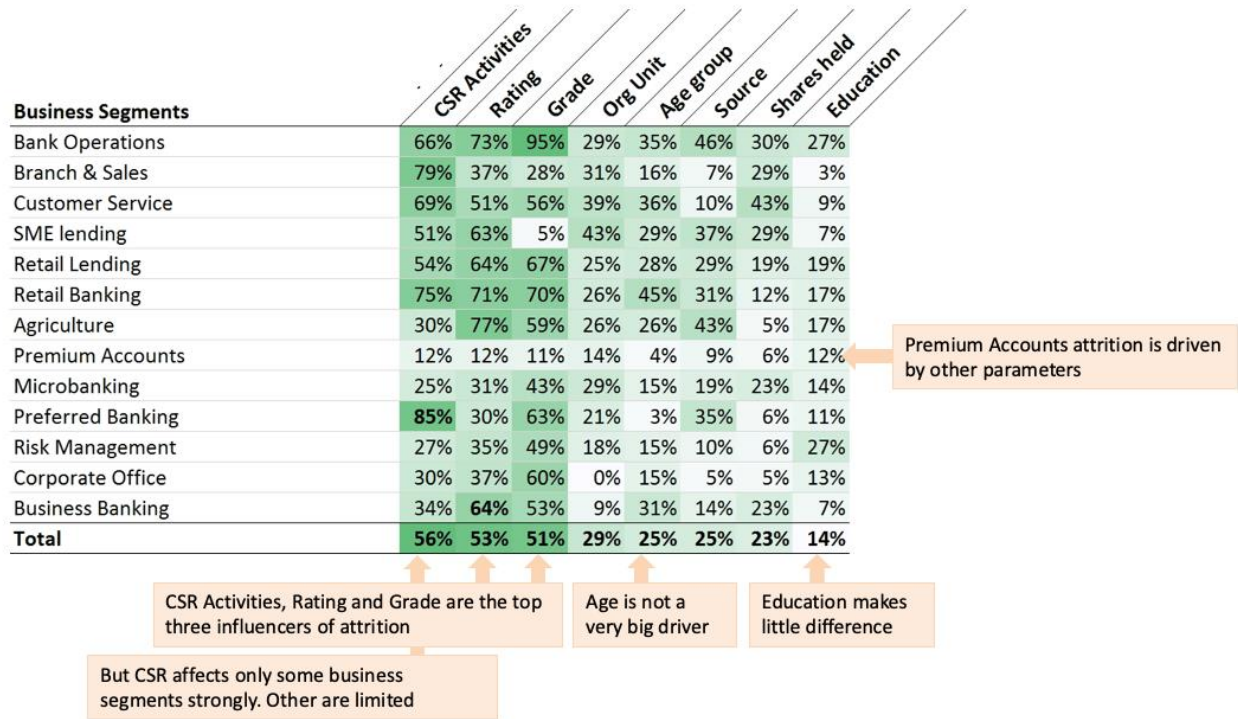Figure 3: Explains Factors That Influenced Attrition in A Bank, Higher Percentage Indicates Bigger Impact (Kesari, 2019)

Human Resource Information Systems Implementation in Global Organizations:

The market is expected to rise as novel technologies such as the Internet of Things (IoT) and analytics help to develop competent employees and improve employee retention (HR Analytics Report, 2020). Businesses may focus more on promoting employee engagement, facilitating employee onboarding, and increasing worker efficiency with the help of those solutions (HR Analytics Report, 2020). These analytical tools enable HR professionals to manage, attract, and retain people, potentially increasing the organization's Return on Investment (ROI), improving productivity, and providing a better work environment (HR Analytics Report, 2020).

To improve their software designs and meet customer needs, human resource management solution providers are focusing more on current technology advances in the sectors of Internet of Things (IoT) and computing (AI) (Bobriakov, 2020). Many businesses are investing in R&D in order to provide clients with solutions that are simple to understand, deploy, and provide enhanced efficiency (Bobriakov, 2020). Major solution providers, such as Oracle, SAP SE, and Workday Inc., for example, provide their products on the cloud to reduce the need for regular system upgrades (Bobriakov, 2020).

Furthermore, government attempts to encourage the adoption of digital technologies, mobile applications, and internet connectivity in order to reduce

manual labor and boost organizational efficiency are likely to drive market

expansion (Bobriakov, 2020).
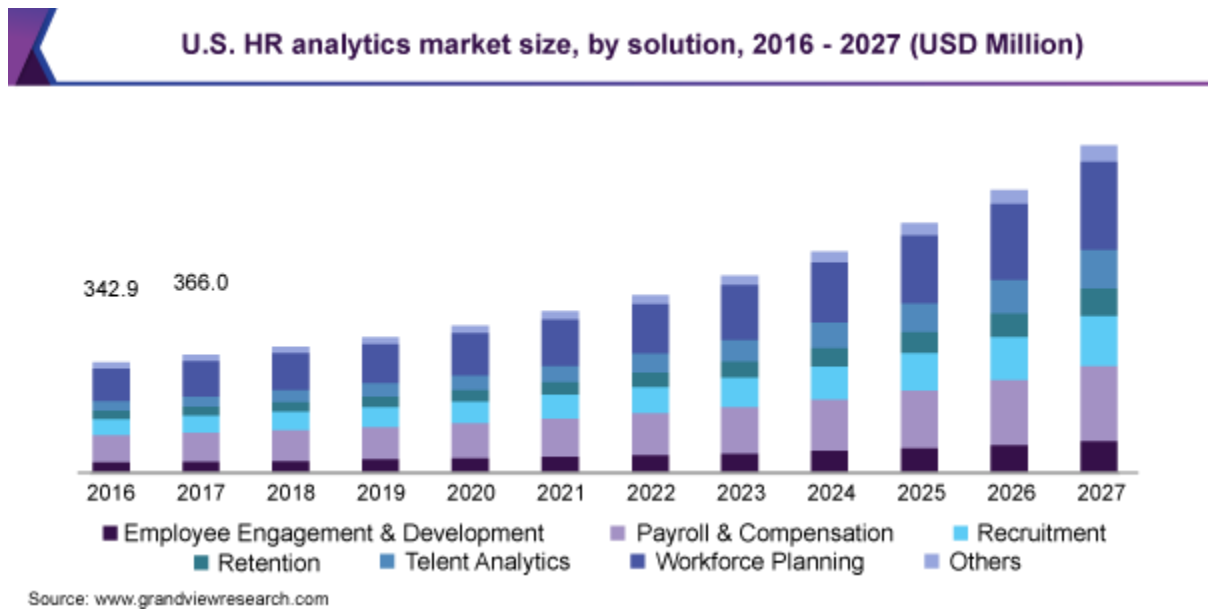
Figure 4: United States Analytics for HRIS
From Year 2016-2027 (Capterra, 2021)

Academia
BFSI
Government
Healthcare
IT & Telecom
Manufacturing
Retail
Others
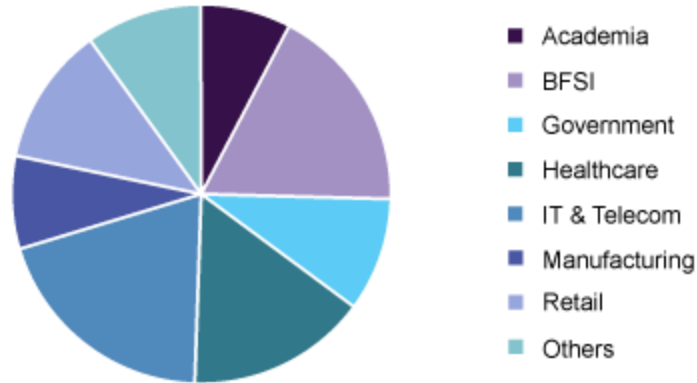
Source: www.grandviewresearch.com

Figure 5: Europe Analytics for Year 2019 (Capterra, 2021)

Human Resource Information Systems Implementation in Various Industries

It is quite difficult for businesses to function without adequate HR analytics results. Data science and analytics have been shown to be useful in not only recruiting and discovering better-skilled individuals, but also in identifying the issues that cause talent to leave firms. It also aids in increasing ROI and putting the company in a better position in comparison to its competition (Sisense, 2021).

Employee Turnover Rate

Employee Turnover Rate

| Turnover Rate: **25.34%** | Employees th... 169

Current Avg Seniority In Months

20.05 Actual seniority

Benchmark Seniority   27.85

Turnover rate Year over Year

17.2% (2013), 20.9% (2014), 25.3% (2015), 33.2% (2016)

Turnover rate by Division

- IT — 31.3%
- Marketing/Sales — 27.1%
- Mobile/Web — 25.5%
- Customer Success — 24.5%
- R&D — 24.0%

Actual VS Benchmark work time in months per Division

■ Actual ■ Benchmark

Division	Actual	Benchmark
Customer Success	20.23	30.33
R&D	20.65	28.2
Marketing/Sa...	20.08	27.5
Mobile/Web	18.4	27
IT	14.34	22

Breakdown Position Turnover rate Year over Year

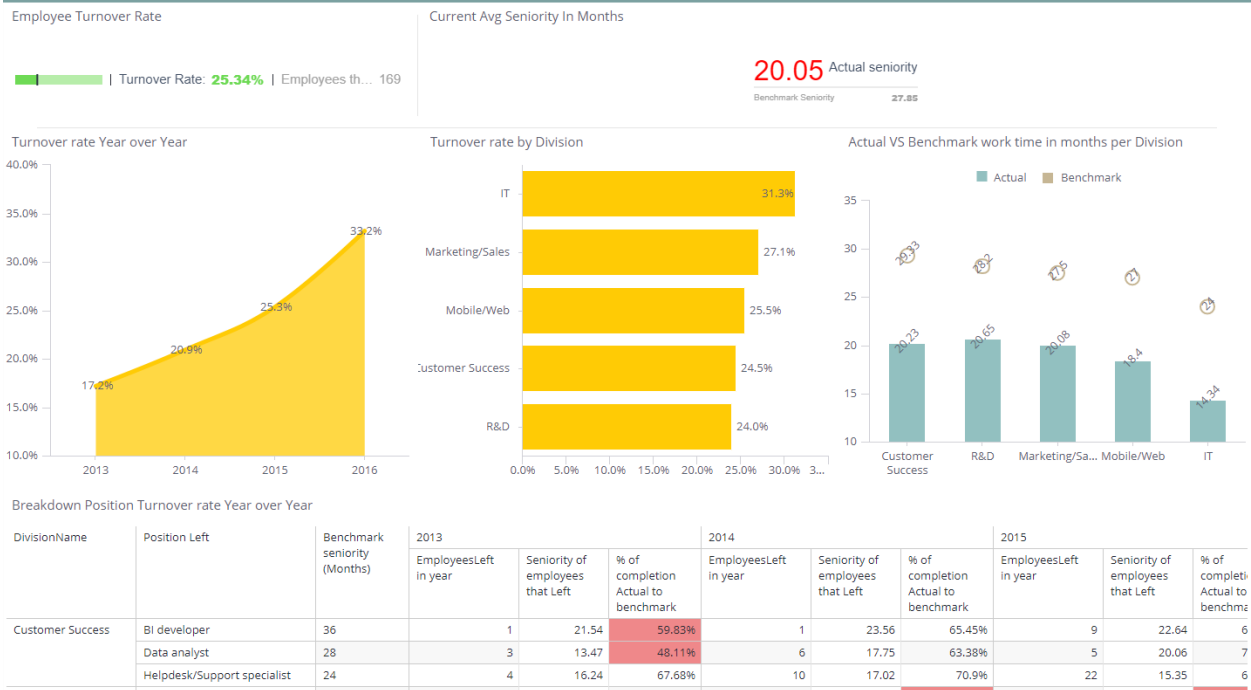| DivisionName	Position Left	Benchmark seniority (Months)	2013			2014			2015		
			EmployeesLeft in year	Seniority of employees that Left	% of completion Actual to benchmark	EmployeesLeft in year	Seniority of employees that Left	% of completion Actual to benchmark	EmployeesLeft in year	Seniority of employees that Left	% of completion Actual to benchma
Customer Success	BI developer	36	1	21.54	59.83%	1	23.56	65.45%	9	22.64	6
	Data analyst	28	3	13.47	48.11%	6	17.75	63.38%	5	20.06	7
	Helpdesk/Support specialist	24	4	16.24	67.68%	10	17.02	70.9%	22	15.35	6

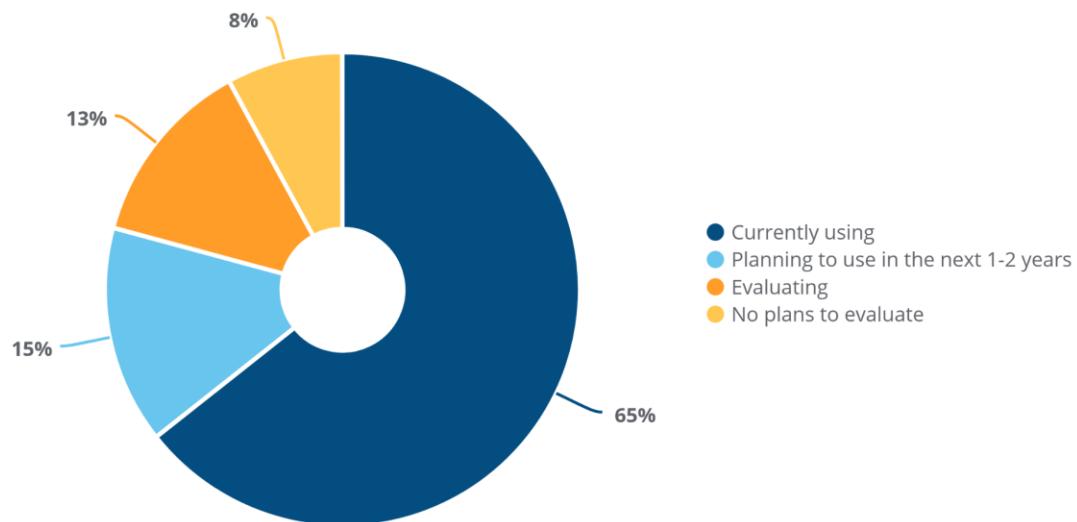Figure 6: Employee Turnover Analytics (Charman, 2021)

HR departments have implemented Data Analytics in all the functions over the years. To understand the implementation of HR analytics, consider a case of recruitment function in an organization.

The Role of Technology in Recruiting

From chatbots that support to screening process to AI-based algorithms that identify the most qualified candidates for the job, the way companies recruit is changing. Deloitte data points to the areas where HR professionals believe technology will increase in use over the next three years.

Source: 2019 Deloitte Global Human Capital Trends

SelectHub

Figure 7: Role of Technology in Recruitment (Capterra, 2021)

HR Analytics has been evolving in small businesses with a decrease in cost of hardware and software. With the right guidance, many small scale business leaders have learned to implement technology in their basic functions, including the HR department. Consider the following graph that explains the use of HR software among Small Businesses across the US.

HR Software Usage Among U.S. Small Businesses

8%

13%

15%

● Currently using
● Planning to use in the next 1-2 years
● Evaluating
● No plans to evaluate

65%

Source: Capterra Top Technology Trends Survey 2019
Q: Which of the following technologies is your organization using or planning to use in the next 1-2 years?
Chart only shows data for HR software responses.
n: 530
Note: Percentages may not add up to 100% due to rounding.

◤Capterra

Figure 8: Use of HR Analytical Software Across The Country (Capterra, 2021)

CHAPTER FIVE:

CONCLUSION

Limitations and Challenges

The most common challenge identified in the research is lack of technical skills within an organization while implementing Data Analytics in the HR department. This requires dedicated expenses for employee training within the HR department to increase efficiency with the new technology in their daily functions. Therefore, cost required for training and multiple software and hardware requirements for HRIS implementation.

There's also maintenance cost required by the system more often to ensure efficient and effective results. Another concern identified in the research is the privacy and security issues related to the HRIS implementation (GOUNDAR, 2021).

The implementation of formal rules to ensure that high-quality data is obtained and managed in an ethical and legal manner is referred to as data governance (GOUNDAR, 2021). Because it uses current technologies to acquire and analyze huge volumes of data to enhance managerial decision-making, HR Analytics has the potential to generate ethical and legal difficulties (GOUNDAR, 2021). The very first fault of Artificial Intelligence is permitting computers (machines) to perform ethically sensitive judgements. Human cognitive should be fed HR analytics, it was recommended (GOUNDAR, 2021). Predictive models

can assist decision-makers by providing alerts, but they cannot make or arrive at judgments (Mohammed, 2020).

Because firms have a large volume of data that is difficult to acquire, process, and maintain, HR analytics suffers data quality difficulties. Due to the absence of reliable data provided by employees, data obtained may include missing or incorrect attributes. There may be redundant data or information that has been distorted during the transmission from one repository to some other. The HR analytics platform generates results derived from data; although, if data integrity concerns exist, the results isn't quite as intended (Gaur, 2021).

Future Of Human Resource Information Systems

While these sophisticated data metrics provide invaluable information to HR professionals, it is critical for HR to figure out how to keep part of their position in order for certain technologies to actually provide human value (MSU, 2020). The analytics underpinning these five apps can be used to tell organizational design through a predictive strategy, which can assist shape future position descriptions, prepare people for these roles, and satisfy the organization's demands (MSU, 2020).

A data-rich HR department requires employees that are proficient within the analytical abilities to evaluate and harness the power behind data-driven intelligence, with around 40% of organizations globally automating their HR departments (MSU, 2020). HR professionals (and their enterprises) can gain an advantage by improving their experience and competencies in data processing and analysis, machine learning applications, and business analytics (MSU, 2020).

As investments are made in the new wave of HR technologies, data analytics skills will become increasingly important as they try to get the most out of their money (Charman, 2019). Having intellectually curious people who can investigate and evaluate data, figuring out where it came from, what it tells them, and where the anomalies are (Charman, 2019).

Conclusion

Human Resources management functions have mostly been taken over by information technology solutions (ADP, 2021). Human Resources software, core HR IT systems, cloud-based, and outsourced (ADP, 2021), these systems offer an alphabet soup of potential for business owners that can be confusing and overwhelming at times (ADP, 2021). HRIS technology patterns are shifting, putting pressure on suppliers to develop next-generation solutions for businesses.

Developing companies are aiming for quiet record keeping in HRIS technology advances. They prefer products that combine "Enterprise Resource Planning (ERP)" (ADP, 2021) with "Human Resource Management Systems" (HRMS) (ADP, 2021). They respect typical human resources software hire-to-retire procedures such as recruitment, archiving, performance management, and compensation (ADP, 2021), but they need that data to be linked with the freedom to track and manage personnel outside of the organization, according to (ADP 2021).

As a result of technological developments and industry advancements, businesses have evolved their use of HR analytics to enhance organizational productivity. Statistical models and approaches are used to quantify and provide data-driven decision making in HR analytics (Gaur, 2021). HR analytics analyzes all essential HR data and interprets it more effectively (Gaur, 2021). HR analytics

has aided firms in establishing a competitive edge, resolving HR-related issues,

boosting organizational performance, and enhancing HR functions (Gaur, 2021).

Certain knowledge and skills can be learned and adopted to close the knowledge

and skill gap (Gaur, 2021).

Organizations will embrace and begin utilizing HR analytics inside their

HR departments if they grasp the correct goal for employing HR analytics (Gaur,

2021). (Gaur, 2021). HRIS will become more frequently used in the near future,

assisting businesses in obtaining evidence-based results and assisting HR

departments in shifting from traditional to rule-based decision-making (Gaur,

2021).

This requires more extensive research on how to implement best practices

in the HR department using Data Analytics. Since HRIS software is provided by

many vendors, this can be a focus for future research on effective software

based on organization's own requirements.

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