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Review

Adoption of HR analytics to enhance employee retention in the workplace: A review

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Abstract: Human resources (HR) analytics is garnering increasing interest each year and is set to play a pivotal role in the development of human resources. In the present era, numerous companies are harnessing the power of analytics to gain a competitive advantage by comprehending all the vital aspects of their workforce by enhancing employee retention through leveraging HR analytics to inform strategic HR choices. Many companies are now incorporating analytical tools into their HR function as a fact-based approach to develop relevant strategies and make informed decisions in managing their workforce more effectively. However, HR faces several challenges in implementing data analytics. Talent management commonly utilizes data analytics to enhance employee engagement, including retention rates, recruitment, job satisfaction, and happiness. This paper discusses the adoption of HR data analytics to enhance employee retention in the workplace. This study delves into the significance of HR data analytics in the realm of employee retention, aiming to assess the efficacy of data-driven decisions. A thorough examination of scholarly publications was undertaken, encompassing both indexed and non-indexed papers sourced from reputable electronic databases to gain insights into the present understanding of HR analytics and its influence on employee retention. The discussion uncovers that HR analytics has a noteworthy impact on improving employee retention in the workplace.

Keywords: HR; data analytics; employee retention; workplace

1. Introduction

The research of human resource (HR) analytics receiving great attention among scholars. The use of data in HR is referred to in terms such as “workforce analytics”, “human capital analytics” or “HR analytics”, among others. HR analytics is an emerging discipline, with several definitions of the term. HR analytics is defined as “processes to collect, transform and manage key HR related data and documents; to analyze the gathered information using business analytics models; and to disseminate the analysis results to decision makers for making intelligent decisions” (Jabir et al., 2019). It is also referred to as quantitative and qualitative data and information management that aims to gain insight and support decision-making processes regarding managing people in organizations (Handa and Garima, 2014; Zhao and Carlton, 2015). Marler and Boudreau (2017) defined it as “An HR practice enabled by information technology that uses descriptive, visual, and statistical analyses of data related to HR processes, human capital, organizational performance, and external economic benchmarks to establish business impact and to enable data-driven decision-making.” To simplify, HR analytics is a relatively novel intervention in the larger domain of human resource management (HRM), and it refers to the use of statistical

tools, measures, and procedures, which can be used in employing and masking the most effectual decisions such as HRM strategies and practices.

HR analytics is a paradigm shift from a traditional and intuitive-based approach to an evidence-based approach to accelerate decision-making processes to develop internal personnel as well as organizational performance to eventually attain profitability. HR analytics is a broad term to describe the use of big data and Internet-of-Things to derive insights which is relevant to various HR elements (LaValle et al., 2011). These various HR elements could range from getting information about the pool of prospective candidates for recruitment, supporting the decision-making process, enhancing HR processes more efficiently, and identifying and resolving HR issues. Besides those elements, HR analytics plays a crucial role in employee retention (Bulsari and Pandya, 2023).

Although the possibilities for HRM offered by analytics have been realized by employers and organizations, there remains immense room for growth in the area of retention of employees and the study of the relevance of analytics within the retention of employees. In today's dynamic working context, retaining great talent has emerged as a key priority for organizations across industries. Employee turnover not only interrupts operations but also incurs significant expenditures, ranging from recruitment fees to the loss of institutional knowledge. Recognizing the crucial importance of retaining competent workers, organizations are increasingly using HR analytics as a strategic tool to improve employee retention (Lee and Lee, 2024).

Therefore, the current study aims to investigate the existing literature on the relationship between HR analytics and the role they can play in improving employee retention. Throughout this systematic review, the study will evaluate existing literature on HR analytics and employee retention to provide a comprehensive understanding of the current state of knowledge in this domain, namely, (i) the development of HR analytics practices, (ii) implications for HR analytics on employees retention, (iii) factors affecting employee retention, (iv) HR data analytics enhance employee retention, (v) resource-based view (RBV) theory, and (vi) implications for HR analytics on employees retention.

2. HR analytical field in human resource management

Human resource management has emerged as a crucial functional area within organizations. According to Opatha and Uresha (2020), HRM refers to the effective and efficient utilization of human resources to accomplish the goals of an organization. The primary objective of HRM is to attract and retain competent and satisfied employees who can contribute their utmost towards achieving organizational objectives and goals. Human resources encompass all categories of employees working for the organization. In the current competitive business landscape, human resources have become a strategic asset for companies due to their rarity, value, uniqueness, and irreplaceability. Thus, employee retention is a crucial aspect for organizations as it pertains to their ability to retain employees for an extended period. In today's technologically advanced world, AI has been integrated to enhance employee retention in organizations. The growing interest from both professionals and scholars in utilizing AI in HRM (Vrontis et al., 2021) reinforces the assertion that

HRM has evolved into the most data-driven function within organizations. Specific AI capabilities that capture the attention of HR professionals include AI's ability to handle large amounts of data (Vrontis et al., 2021) and its capacity to utilize machine learning to analyze past data for predicting future outcomes (Berhil et al., 2020). For instance, an organization aiming to recruit top-tier talent may analyze the profiles of current high performers within the company, such as their backgrounds, education, work history, and so on, to forecast which job applicants have the potential to excel. While this task could be performed manually, AI can process the information much more efficiently. Furthermore, as new hires are onboarded and their performance is assessed, the AI can identify which candidates have indeed excelled and adjust its predictions for future hires accordingly.

A well-known expert in the analytics field has expressed that analytics is set to transform HR practices significantly, acting as the main driver behind business intelligence and a fundamental requirement for sustainable organizational success (Fred and Kinange, 2015). Analytics is closely linked with a range of disciplines including computer science, engineering, and science (Ghasemaghaei et al., 2018). In today's complex business landscape, data plays a crucial role in decision-making, with all decisions being rooted in data and evidence (Andersen, 2017). Human Resources, previously seen as a theoretical domain, now heavily relies on data for various functions like recruitment and employee management. The importance of data interpretation cannot be emphasized enough, and this is where human resource analytics comes into play (Mondore et al., 2011). The practice of collecting and analyzing HR-related data to improve workforce performance within an organization is known as HR analytics (Jugulum, 2016). This practice is also known as talent analysis, individual analysis, or workforce analytics (Edwards et al., 2022). By leveraging data from HR and organizational sources, HR analytics utilizes a variety of data analysis methods (Chatterjee et al., 2022).

HR analytics provides empirical evidence of how HR initiatives align with organizational goals and strategies (Qamar and Samad, 2022). It offers data-driven insights into what is working and what needs improvement, enabling businesses to progress and develop better strategies for the future (Chalutz Ben-Gal, 2019). The steps involved in HR analytics are outlined by Margherita (2022). HR analytics plays a crucial role in comprehending employee behavior through the analysis of diverse data sets and recognizing their underlying patterns. For example, organizations can gain insights into their employees' sentiments and behaviors by examining absence rates and patterns to address employee concerns. Additionally, by conducting employee surveys and scrutinizing the collected data, organizations can pinpoint the HR factors that significantly impact employee engagement and satisfaction. Consequently, this aids in identifying interventions to enhance employee engagement and job satisfaction. Dulebohn and Johnson (2013) highlighted that the main objectives of HR metrics and analytics include assessing and generating HR metric reports to evaluate individual, unit, and organizational performance. Furthermore, it enhances the HR decision-making process by adopting an ROI-based approach, calculating relevant metrics, and comparing them against industry standards and periodic outcomes. The implementation of HR analytics will facilitate a better understanding of the most effective strategies for recruiting, selecting, training,

motivating, developing, evaluating, and retaining employees to effectively achieve organizational objectives, while also reducing turnover rates within the organization.

2.1. Development of HR analytics practices

In 1990, the practice of comparing data with HR functions gained popularity, this is known as "benchmarking." The concept aimed to assist organizations in gaining insights and evaluating business performance against others. An article by Davenport (2010) in the Harvard Business Review introduced the idea of "talent analytics", shedding light on how to measure HR activities, which resonated with many organizations and researchers worldwide. Despite the challenges in data collection, storage, and interpretation, organizations remain optimistic that analytics can provide answers to questions such as what has happened, how, why, and what may occur in the future. This understanding can lead to evidence-based decisions that significantly impact business outcomes. Research by Bersin and Wang (2013) revealed that only 10% of Fortune 500 companies utilize advanced analytics, with 6% still relying on statistical methods and 4% employing predictive and prescriptive analytics. A study conducted by the Massachusetts Institute of Technology (MIT) indicated that "Top-performing organizations use analytics five times more than low-performing organizations" (La Valle et al., 2011). Deloitte's 2017 survey highlighted that 71% of companies recognize the importance of HR analytics in measuring company performance, yet only 8% believe they have usable data, 9% have valid reports to comprehend the factors driving organizational performance, and 15% have implemented HR scorecards for line managers.

Bersin (2016) conducted a comprehensive study that highlights the widespread use of HR metrics and scorecards in companies. However, the study emphasizes the need for HR analytics to provide a meaningful description of the measurements that truly matter. This involves utilizing statistical tools, models, and appropriate data, as well as analyzing and evaluating the data using scientific standards. The results obtained from these analytics can then guide business decisions. Prominent organizations such as IBM, Oracle, Accenture, Phillips, Google, and Wipro have already embraced HR analytics practices. By leveraging these practices, these companies can identify high-performing individuals, enhance profitability and employee satisfaction, and effectively manage attrition. Ultimately, the adoption of HR analytics enables these organizations to achieve better overall performance. Despite the known benefits of HR analytics, many companies struggle to transition from traditional practices. Kapoor and Kabra's (2014) study reveals that one of the main challenges faced by HR teams is the collection and analysis of data, as well as a lack of analytical executives with statistical expertise. A significant number of organizations still rely on spreadsheets and reports to analyze employee data. Additionally, some organizations face obstacles such as a lack of necessary tools or financial resources, while others are hesitant to take risks associated with advanced analytics practices.

2.2. HR data analytics enhance employee retention

Employee attrition or voluntary turnover is a significant concern for

organizations as it not only impacts their productivity and long-term growth strategies but also their work sustainability retaining employees poses a major challenge for both recruiters and employers, as attrition results in the loss of valuable skills, experiences, personnel, and business opportunities. In the era of data analytics, organizations and their human resources managers are leveraging people analytics to address attrition by transforming their approach to attracting and retaining talent. HR analytics is now considered an essential capability for HR management and a tool that enables the creation of value from people, while also expanding the strategic influence of the HR function (Angrave et al., 2016). It is essential to identify the right candidate for the success of the organization. A remarkable recruit who aligns with the organization's values, possesses the necessary skills, and motivates those around them can greatly contribute to the organization's confidence and financial growth (Hughes and Rog, 2008).

Talent acquisition, from an HR perspective, involves gathering employee data on various metrics such as education, knowledge, skills, attitudes, and performance. This data provides valuable insights that are derived from background information, skill evaluations, and surveys (Fernandez and Gallardo, 2021). HR professionals utilize this data to understand the key factors for success within the organization. Research has shown that employees also utilize this data to enhance retention rates, making talent acquisition a primary focus for decision-making (Anoopa, 2016). Additionally, organizations turn to talent acquisition to identify skill gaps, create attractive job offers, and gain insights into employee preferences (Jose, 2019). To effectively find exceptional employees, it is important to understand their preferred platforms and channels of engagement.

The contemporary world is heavily reliant on data to drive various aspects of life. Analytics serves as the primary tool for modern employees to understand how their organization operates and to pinpoint areas that necessitate enhancement from a business perspective. Data analytics plays a crucial role in facilitating informed decision-making by providing valuable insights into the direction in which a firm is progressing (Fernandez and Gallardo, 2021). There exist four principal categories of analytics, namely descriptive, diagnostic, predictive, and prescriptive as shown in **Figure 1**. Descriptive analytics focuses on analyzing past events using basic analytical techniques to comprehend facts, patterns, characteristics, and outcomes. For instance, descriptive analysis can be employed to determine churn rates, hiring expenses, and absenteeism. Diagnostic analytics represents an advanced analytical approach that delves into data or information to address the query, "What caused it to occur?". This method is distinguished by methodologies like drill-down analysis, data exploration, data extraction, and identifying correlations. Predictive analytics represents the subsequent phase of analysis, involving making forecasts about future actions and results based on historical data (Necula and Strîmbei, 2019). Lastly, prescriptive analytics aims to optimize outcomes while minimizing resource utilization. To identify the most cost-effective training investment for organizational success, the application of linear programming, simulation techniques, statistical modeling, and implementation support is essential (Angrave et al., 2016).

Figure 1. The types of HR analytics (Ikey, 2023).

The organization can gather important information about employees who are leaving and identify those who may be at risk of leaving by using data from classification or predictive models. By using predictive analytics, the organization can understand the potential effects of changing certain factors and determine which areas need immediate attention. This can help reduce the rate of employees leaving, especially when the organization wants to avoid too many changes. It is important for the organization to handle these changes properly to achieve the desired outcome and ensure that employees accept and embrace the changes. As a result, the organization is likely to take a strategic approach to implementing change and use its resources wisely. The organization can create a program to retain employees by using prescriptive analytics to understand the factors that contribute to turnover and retention. During this process, the organization can make informed decisions and take actions to improve employee retention as depicted in **Figure 2**.

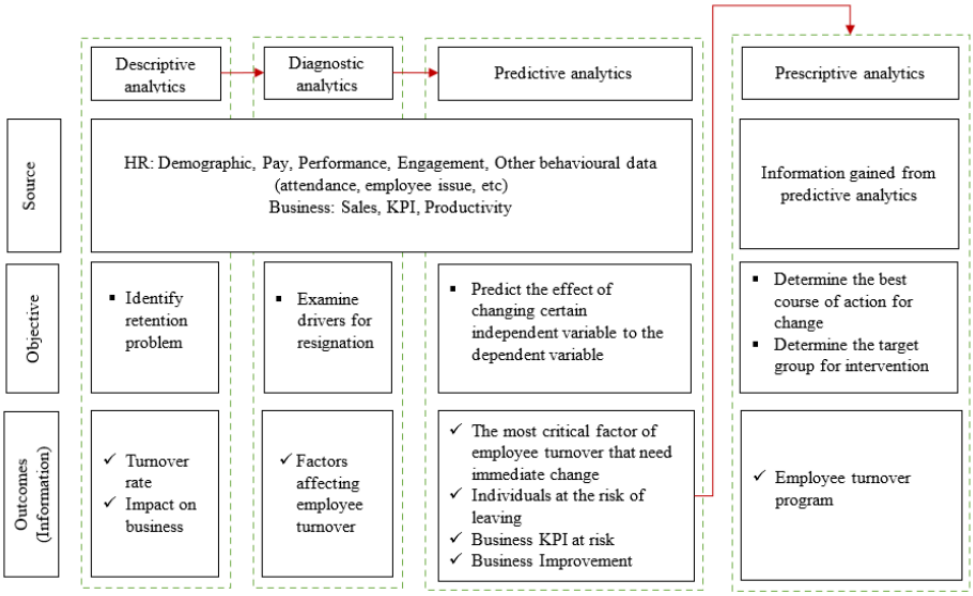

Figure 2. Employee retention strategy framework (HR analytics application) (Latif, 2022).

Setiawan et al. (2020) conducted a research study titled "HR analytics-employee attrition using logistic regression," in which they employed logistic regression to analyze employee attrition. To gain a deeper understanding of the subject, the authors

utilized R studio for tasks such as data mixing, empirical data analysis, data planning, logistic regression, model assessment, and visualization. The study was divided into five stages: data gathering and business awareness, data pre-managing, experimental data analysis, model selection and preparation, and analysis and assessment of the model. To investigate employee attrition, the researchers considered various variables including the number of companies operated, total work experience, years with the current supervisor, frequent professional travel, poor work environment satisfaction, department HR, marital status (separation and wedded), poor job satisfaction, early logout, and working overtime. Additionally, the study also examined the reasons for attrition from both the employee's perspective and the company's perspective. The findings of the study indicate that to improve retention rates, the company should focus on developing the human resource department by assessing factors such as the working atmosphere, work or job satisfaction, employee workload, and communication between managers, leaders, and subordinates.

The researchers conducted a study on job satisfaction and resignations, utilizing the wealth maximization theory of quitting behavior on the German Socioeconomic Panel (1985–2003). Carvalho et al. (2020) observed that job satisfaction is a crucial factor for employees who possess exceptional experience and competency. The researchers took into account voluntary retirement, job satisfaction levels, surprises for employees, and the wealth maximization model to explain their research. The authors explained that the reasons for an employee's decision to leave or resign from an organization must be compared to the present values of future outcomes and the opportunities available outside of their current job. The results of the study confirmed that by conducting a simple subjective survey questionnaire on work structure and satisfaction levels, economists can easily uncover a wealth of hidden information or evidence. In fact, through this survey, a firm or industry can gain valuable insights to improve themselves, surpassing the need for traditional tools. In addition, Bhuva and Srivastava (2018) conducted a study focusing on machine learning techniques for predicting employee attrition rates. The researchers specifically targeted the IT sector and gathered a sample of employee data from IBM USA. The study followed a structured workflow for the analytics project, which included steps such as raw dataset collection, data processing, feature selection and scaling, modeling, model evaluation and tuning, and deployment and monitoring. By utilizing 35 data mining techniques and machine learning algorithms, the researchers were able to predict attrition within the IBM USA dataset. The study highlighted the importance of accurate employee attrition prediction as a significant business challenge. The results of the prediction using data mining techniques revealed that linear discriminant analysis outperformed other methods, with the logistic regression model following closely behind, especially when precision was the preferred metric for evaluation.

Furthermore, Ponnuru (2020) utilized logistic regression analysis to assess the risk of employee attrition. They employed the logistic regression technique to predict the probability of employee attrition in an organization, which was dependent on the demographic data of both current and separated employees. The researchers conducted their study based on a real-life project and collected demographic information from employees who had left the organization as well as those who were still employed. The authors of the study prepared a questionnaire to evaluate the probability of quitting

among the current staff members. The overall attrition risk was divided into two categories: Demographic risk and behavioral risk. In this particular study, logistic regression was primarily used to predict employee attrition risk based on demographic information. Additionally, a comprehensive retention plan was developed to address the identified risk categories. Besides, Zhao et al. (2019) conducted a study to explore the effectiveness of Extreme Gradient Boosting (XGBoost) in predicting employee turnover. XGBoost is known for its reliable performance due to its regularization formulation. The researchers utilized HRIS data from a global store and compared XGBoost with six commonly used supervised classifiers. The findings of the study demonstrated that XGBoost exhibited significantly higher reliability in predicting employee turnover. Another study revealed by Ghazi et al. (2021) proposed a profit-centric performance measure that combines the ideal customer percentage with the highest estimated likelihood of churning. This measure aims to calculate the maximum profit that can be generated through retention efforts.

2.3. Resource-based view (RBV)

Beatie and Smith (2013) emphasized the importance of the resource-based perspective in focusing on the inherent characteristics of employee skills and their contribution to value creation. They argued that the resource-based view (RBV) theory suggests that organizations should prioritize the development and maintenance of core employee skills that are crucial for competitiveness and productivity through internal processes, strategies, and practices while considering outsourcing skills of minimal or tangential value. Haar and White (2013) supported this view by highlighting the significance of investing in internal firm resources or heterogeneous resources that are difficult for competitors to imitate, thus serving as sources of competitive advantage. Ortlieb and Sieben (2012) further elaborated on these resources, indicating that they may include tangible and intangible assets capable of generating high returns over extended periods, such as work-life programs, HRM systems, employee career development initiatives, job enrichment programs, and promotion opportunities. The theory suggests that such resources can lead to significant benefits for organizations, such as improved employee retention, as they are challenging for competitors to replicate (Holtbrugge et al., 2010; Haar and White, 2013). This theory could potentially provide a strong foundation for conducting research in HR analytics. Marler and Boudreau (2016) state that a significant portion of the existing studies in the field of HR Analytics have relied on the resource-based view (RBV), which forms the basis for widely recognized theoretical frameworks like LAMP and the HR scorecard. Marler and Boudreau (2016) propose that HR analytics has the potential to be linked with enhanced employee retention and a competitive edge, provided that it is characterized by distinctiveness and value creation under the principles of the RBV.

3. Methodology

A literature review was conducted to investigate the link between HR analytics and employee retention. The review sought to discover relevant articles published between 2010 and 2023, emphasizing indexed and non-indexed papers from credible electronic databases.

Data sources included Science Direct, Emerald Insight, Scopus, EBSCOhost Databases, IEEE Xplore, and ProQuest. These databases were chosen since they provide a broad and thorough coverage of scholarly literature in human resource management. The initial search yielded 53 publications and articles. Following the screening procedure, 42 publications were identified as relevant to the study, with a primary focus on HR analytics and employee retention. The criteria for article selection included editorial, opinion, theoretical, qualitative, and quantitative studies that focused on the relationship between HR analytics and employee retention.

Articles were excluded if they did not directly address HR analytics and employee retention, or if they were not published within the specified timeframe. Furthermore, articles that did not fulfill the inclusion criteria, such as those that focused on unrelated themes or lacked empirical data, were removed from the review. The limitation of this review evaluation is the dearth of current publications from 2023–2024, which could be attributable to the scarcity of research papers on HR analytics in the context of employee retention during this period.

4. Discussion

According to the literature analysis, incorporating HR analytics into human resource management methods establishes a significant development and step forward in improving organizational employee retention strategies within an organization. Companies can use data-driven insights and advanced technologies like artificial intelligence (AI) to create targeted retention strategies that effectively attract, engage, and retain top talented people. This shift towards the use of HR analytics is consistent with the changing landscape of modern workplaces, in which strategic human resource management is critical to organizational success.

Fernandez and Gallardo (2020) mentioned the necessity of prioritizing key employee abilities or skills that are difficult for competitors to replicate, underlining the usefulness and importance of HR analytics in identifying and cultivating these valued skills. The resource-based view (RBV) theory emphasizes the importance of internal business resources, notably staff talents, in developing and sustaining competitive advantage. According to this RBV theory, investing in HR analytics to improve employee retention can result in distinctive and value-creating practices that competitors will face challenges to imitate (Marler and Boudreau, 2016).

Muhammad and Naz (2022) found that factors such as the work environment, career opportunities, and organizational culture all have an impact on employee retention. The application of HR analytics enables organizations to analyze these issues using data-driven insights, allowing for the identification of patterns and trends that influence retention rates. Companies can use descriptive, diagnostic, predictive, and prescriptive analytics tools to analyze previous events as well as estimate future results to effectively optimize retention strategies. The implementation of HR analytics in employee retention techniques is further supported by the findings of Shet et al. (2021) and Chatterjee et al. (2022), who emphasize the relevance of HR analytics in aligning HR activities or initiatives with organizational goals and strategies. By leveraging data from HR and organizational sources, HR analytics evidently provides empirical evidence for decision-making processes, allowing organizations to enhance

retention rates, improve workforce performance and productivity, and eventually achieve sustainable business success in the long term.

5. Implications for HR analytics on employee retention

To thrive in the ever-changing global landscape, HR Analytics is an indispensable technique for the industry. Therefore, strategic movements and decisions play a crucial role in managing the evolving aspects of the environment. The implementation of HR analytical tools, frameworks, and methodologies is key to enhancing overall organizational improvement, with major players leading the way. The utmost attention must be given to proper recruitment and selection, ensuring the right fitment and job satisfaction. Moving forward, the most significant implication for HR is to design an effective framework for organizational policies that provide a suitable work structure for employees. Additionally, HR should establish a counseling framework that allows employees to address personal and professional stress, discomfort, grievances, and more. A healthy working environment always contributes to enhancing employee performance. Recognizing and retaining employees is imperative in today's competitive world. Large firms and industries can retain their skilled and knowledgeable employees by effectively managing both monetary and non-monetary elements of the HR system. Furthermore, implementing proper rewards and recognition tools is equally essential for the fair assessment of competent, skilled, and talented employees. By prioritizing HR objectives and implementing effective HR analytical tools, organizations can reduce attrition rates and overcome the challenges faced by others.

6. Conclusion and future direction

The primary constraints of this research primarily revolve around the accessibility of literature about the topic. There exists a gap in the existing literature on HR analytics and employee retention, which is limited in scope. Therefore, the existing literature must possess adequate nuance and be grounded in case studies on the adoption of HR analytics to improve employee retention. This will ensure that the endorsed models and frameworks are thoroughly examined, tested, and reliable. Consequently, the present study was constrained by the limited range of literature available for review. Numerous factors contribute to the retention of employees. To fully comprehend the impact of these factors, organizations must gather relevant information and analyze it to extract meaningful insights. It is only through such insights that strategic actions can be taken to retain employees. Effective decision-making in this regard requires a scientific and data-driven approach. This is where data analytics, and specifically talent analytics, play a crucial role. By utilizing data analytics in the management of human resources, organizations can enhance their effectiveness. Such data can not only be used to analyze past trends and formulate plans but also to predict future events. Each new generation entering the workforce has unique aspirations, and it is no longer solely financial compensation that attracts talented individuals. A wide range of non-financial considerations also play a significant role in attracting and retaining talented individuals.

The transition from an industry-focused economy to a knowledge-driven

economy underscores the importance of evolving human resource management practices from conventional to strategic methods. This shift necessitates the utilization of data to inform decision-making processes. Human resource professionals must analyze diverse data sets to comprehend how various factors related to employees can influence organizational performance, particularly from a financial perspective. Leveraging HR analytics in human resource management offers significant benefits, such as enhancing strategies for retaining employees and effectively managing their behavior.

The future of HR analytics in employee retention is expected to have a sizable effect as the field develops. HR needs to prioritize the detection of mental health issues and workplace stress to provide assistance. This can be achieved through the implementation of analytics, that could help recognize symptoms of employee burnout or pressure. Thus, identifying those symptoms permits the early provision of intervention and support programs. Additionally, predictive modeling may be advanced by way of transferring beyond simple identification of who would possibly leave, to predicting both the likelihood and reasons for leaving. This allows HR to tailor additional interventions according to the situation. Furthermore, improvements to prescriptive analytics can go beyond just identifying issues by also recommending explicit actions on how to address them, thus enabling HR's transition from reactive to proactive retention strategies. Besides, experience analytics can be stepped forward by analyzing employee journey data during their tenure with the company. This enables HR to pinpoint crucial touchpoints that influence retention and personalize the employee experience.

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