

# In-depth Analysis of Extant Business Analytics: A Review from the Human Resource Perspective

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**Abstract** - *Abstract - In today's digital world where data analytics has been incorporated in most businesses to extract high-quality insights towards achieving ultimate success. Human Resource (HR) has embarked on this new paradigm to reap full benefits out of idle data of treasured talent. This paradigm shift is imperative to transform HR from playing the conventional reactive roles of administering labor-related transactions to becoming a proactive business enabler that can provide viable solutions in developing their workforce to unlock their full potential. This would enable them to perform at an optimum level and eventually safeguard the organization's return on human capital investment. This review was carried out to explore the extant application of contemporary analytics in the HR domain as well as the prevailing gaps and probable research soon. The lack of data quality and analytics expertise in HR is found to be two of the major obstacles in this domain. Opulent opportunities lie ahead for much of this uncharted territory still awaits to be explored the talent capability development through HR analytics, as existing work is very much focused on manpower planning, talent acquisition and staff retention. This paper concludes with advocating a gradual extension of advanced analytics in HR disciplines, at the same time empowering employees to meet their aspirations, as well as learning, needs to bring greater victories.*

**Key Words:** Human Resources, HR analytics, workforce management, talent management, capability development

## 1. INTRODUCTION

Over the past decades, data science and data analytics have gradually taken the center stage in all industries and domains, spanning from sales and marketing, manufacturing, healthcare, finance, customer service, traffic management, geology, weather forecasting, social media to essentially all disciplines which are in the limelight. While organizations realize many ways, advanced business analytics and visualization can help transform their raw data into meaningful insights to improve their operational and strategic performance. This phenomenon of globe-wide popularity and adoption is also the result of the incessant introduction of cutting-edge technologies that are becoming much more affordable compared to the early days. These novel solutions such as high organizational memory capacity, high processing speed, advanced automation tools and commendable machine learning modelling have pushed countless businesses towards reaching greater heights.

Similarly, the trend has also grasped the interest of HR practitioners at a global scale, regardless of the size of the company. HR has been one of the indispensable right-hand enabler units in any organization in charge of imperative functions such as workforce planning, recruitment, employee records, workforce scheduling, leave management, benefit and compensation administration, payroll administration, mobility, learning administration, competency management, talent review, performance management, succession planning, and exit management. HR, like other core and support services in a corporation, is the custodian of a great volume of treasured company data. In this regard, the abundance of employee data that are stored in the HR information system holds considerable promise to make data-driven decisions via analytics in managing corporate talent.

In addition to HR analytics, the terms people analytics, workforce analytics, and talent analytics have all been coined to refer to the application of analytics in HR [1]. For good measure, several past researchers also provided their respective definitions for this phrase. Ref. [2] defined HR analytics as a proactive and systematic process for ethically gathering, analyzing, communicating and using evidence-based HR research and analytical insights. On the other hand, Ref. [3] described it as the use of advanced analytics to procure a deep understanding of human capital, workforce dynamics and employee performance. In the year 2020, the Chartered Institute of Personnel and Development (CIPD), one of the largest HR professional associations in the world, distinguished HR analytics by stating one subtle difference – the use of employee data as the ingredients.

The emerging discipline of HR analytics is worth exploring where the application of analytics seems relatively new in this domain, while accepted and adopted early in other fields. Ref. [4] also elaborated how most companies still prioritize analytics in their main businesses and HR is merely at their preliminary stage of getting on board, while the others are trailing behind, streamlining headcount or performance reports.

This paper was initiated to undertake an in-depth exploration of the existing research about HR analytics and acquire an understanding of its role, benefits, gaps, potential and prospects in today's business world.

## 2. IN-DEPTH ANALYSIS OF EXTANT HR ANALYTICS APPLICATION

### 2.1 The Rise of Analytics in Human Resource

While data analytics and visualizations have successfully grasped the attention of businesses from all walks of industry around the globe. It has become the main interest in furnishing data-driven analyses and ultimately steering companies towards greater heights. HR departments that look after employee remuneration and workforce management in most organizations jumped on the bandwagon as well, albeit not immediately, for the prospects of transforming their abundant employee data into actionable insights. Ref. [5] also explained in his paper that HR analytics, despite being new in the larger HR domain, has started making its way to become an indispensable part of any business setup.

Because of the many opportunities that data analytics and visualizations can unlock in today's business world, companies have started to adopt a full-scale approach in instilling analytical thinking and culture at all working levels and areas of expertise, where HR is not an exception. Ref. [3] also highlighted the urgency for HR to embark on the data analytics journey and adopt a more proactive approach in adding values through maximizing the use of the HR data at hand.

Ref. [3] pointed out that employees are the most important asset an organization can have as they are the ultimate determining factor in defining its long-term success and viability. However, as compared to other domains like sales, marketing, healthcare, finance, transportation, and social media where data analytics has resolutely called for its well-received adoption since the advent of big data, data science is still fairly new in HR, and executives in charge of business talent are still struggling to transform raw data into useful insights [7]. Although there has been some growth of HR metrics and scorecards (key performance indicators) used to measure employee performance and business results from the HR perspectives. The embracing of analytics in the HR world can be considered rather late and this has proven costly as the abundance of long-existing employee data has been sitting idle and not put into good use. Hence, this warrants a dire need for HR analytics to transpire immediately for taking on a more prominent role in adding values to the organization by giving meaning to their treasure of employee data and enabling better decision making on workforce management.

### 2.2 Analytics Back to Basics

The gradual emergence of analytics in the HR discipline has also called for the need for a structured approach for HR practitioners to carry out HR specific analytics work. Some researchers have developed conceptual frameworks and guidelines to achieving strategic human resource management through analytics. The issue of having no standard framework or model to guide HR practitioners in performing their specific HR analytics job has been exclusively realized in the current era. Ref. [2] addressed that an HR analytics cycle can be used as a systematic

approach in executing end-to-end HR-related analytics work. Figure 1 below illustrates the seven-step process that encompasses the following iterative activities: (1) determine stakeholder requirements, (2) define HR research and analytics agenda, (3) identify data sources, (4) gather data, (5) transform data, (6) communicate intelligence results and finally (7) enable strategy and decision making. With the guidance of such methodical flow, the rate of HR engagement, and mastering analytics can be accelerated despite its relatively late entry into the game.

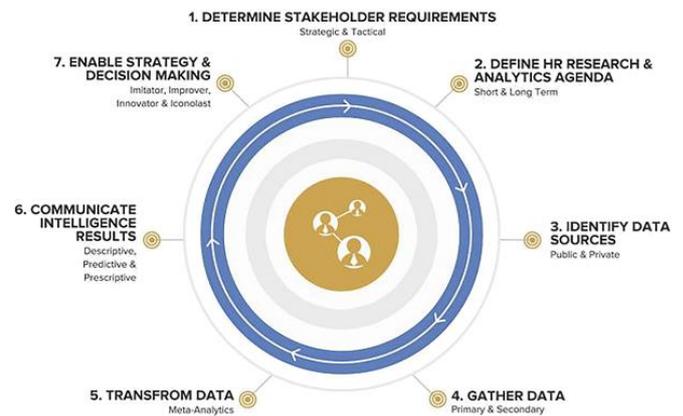


Figure 1: The HR Analytics Cycle [2]

Some other models were also formulated to discover insights into specific HR subjects. For instance, Ref. [8] zoomed in on employee leave and performance module specifically and rendered a conceptual framework to assess the influence of employee presenteeism (attending work despite being ill) on job commitment as well as employee turnover intentions. Such a dynamic model could be further studied to allow identification of other significant factors yet to be included or enhanced as a Structural Equation Modeling (SEM). It can serve as an efficient estimation technique where separate regressions can take place simultaneously and at the same time flexible specification of attributes is permitted to inspect their corresponding relationships.

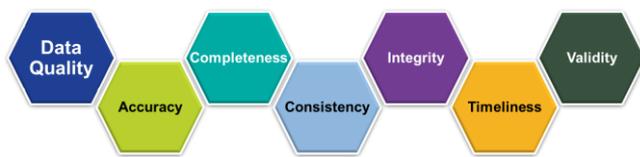
### 2.3 Challenges in the HR Analytics World

Just like all other fields in the industry, HR's quest for knowledge and insights through analytics did not gain ground unwaveringly despite its challenges. In addition to highlighting the benefits of extracting meaningful insights from HR data, Ref. [9] also noted the novelty of big data in the field of HR, and with it comes together with the challenges in handling its different aspects due to volume, velocity, variety, veracity, and value. By classifying these obstacles into three categories: technical, methodological, and ethical, the authors discussed the complications often encountered by HR practitioners, like the absence of computational capacity, deficiency of data quality and shortage of competent skills to name a few.

The research carried out by Ref. [10] also yielded similar results when they explored the use of analytics in both public and private organizations' HR departments. It was revealed

that most companies only performed traditional HR administrative work such as record management and payroll processing, with no analytics of any kind instigated due to the absence of data quality, management support and competent personnel. Through a report titled “People and Workforce Analytics in Switzerland - Challenges and Opportunities”, Ref. [11] stressed the importance of HR analytics on how it can realize HR full strategic potential, not omitting the emphasis on the existing challenges in securing good data quality as well as fostering data fluency and data-driven culture in businesses. Similarly, Ref. [6] also advocated the necessity to bring in recruits with statistics or analytics backgrounds and interests into the HR department, in addition to the management group pledging to invest and commit to this discipline.

Further, Ref. [12] highlighted the need to insource skilled workforce to promote advanced analytics in HR to accelerate the gradual acceptance and adoption process. Nevertheless, just like all other data analysts from other fields, data quality appears to be one of the most common issues in this domain as well. The data quality was found to be the major issue requiring huge effort in cleansing and organizing attested by Ref. [13] when employed machine learning algorithms in their research to predict an industrial aluminium company’s attrition rate. This is also one of the main reasons drawing many domains including the HR field.



**Figure 2:** Dimensions of Data Quality [14]

Data quality has been a long-existing issue since the beginning of record-keeping. The vast amount of data collected may subsequently prove to be an inconvenience and burden if there exists no proper mechanism to ensure data quality is in place. Even though manual processing and preparation of the data have been digitalized in the contemporary digital world. This technological convenience has eased and quickened the pace of the raw data capturing process. Many research papers and institutions have also drawn attention to the importance of data quality in the past. Ref. [14] has composed a list of six dimensions that account for data quality as shown in Figure 2, organizations must ensure that their data comply with all these criteria, namely accuracy, completeness, consistency, integrity, timeliness, and validity to prevent the Garbage-In-Garbage-Out (GIGO) situation.

## 2.4 Prevailing Descriptive & Predictive Analytics in HR

Nevertheless, the burgeoning HR analytics has also been progressing moderately well for some major corporations that did not face similar challenges described in the preceding section. In many cases, these corporations have

moved beyond traditional HR reports that can only provide hindsight to a particular incident, or in other words, what has happened. This conventional approach of reporting contributes little value to the team as almost no measures can alter the event that has already transpired, either within or outside of the company’s control. Hence, the adoption of descriptive analytics by HR practitioners can furnish more business value using advanced business visualization tools to analyze data patterns and diagnose the reasons why certain events took place. Moving beyond, fewer enterprises embrace predictive analytics to predict business trends and gain foresight of future occurrences.

As HR is an enabler service that coordinates workforce planning and looks after employee welfare, all the analytics activities are typically carried out with the main aim of bettering employee work experience and securing the company’s position and competitive edge in the market through acquiring and preserving talent. The application of analytics in HR has been very much focused on forecasting workforce requirements and succession planning, determining the hiring & selection process and predicting employee turnover [6]. Ref. [15] also stated that two common utilization of analytics in HR includes enhancing staff morale, improving retention through measuring the wellbeing of their employees, anticipating specific workforce issues or gaps, and tailoring incentives to their needs accordingly to mitigate attrition risks.

A study conducted by Ref. [16] found that majority of the individuals often employ the concept of analytics in data and visual presentations, stopping at the descriptive analytics stage without venturing into predictive analytics. While a small group of them embrace the use of predictive analytics on succession planning, recruitment, and performance management. The lack of analytics skills and knowledge about HR metrics are two main factors that hinder the progression into a more advanced stage of data mining and knowledge discovery.

On the other hand, Ref. [3] described in their paper how predictive analytics have been used in the HR domain to assess attrition of individual employees using exit management predictive models, such that potential instances of high performing staff tendering resignations can be foreseen. This used to support some countermeasures like recognition or reward programs to take place in time to retain valuable talents and guarantee business continuity. In effect, the cluster, as well as factor analyses, can also be carried out to spot specific characteristics that often lead to attrition or reasons that increase the probability of employee exit. Moreover, these factors can also be identified by employing machine learning modelling techniques such as logistic regression and artificial neural networks, which can untie more complex patterns as opposed to conventional methods relying on correlation, or human intuitions.

In addition, the use of predictive models was also described to perform HR capacity forecast and recruitment needs. By utilizing predictive analytics in talent acquisition, companies can envisage both short-term and long-term manpower needs and formulate respective employment plans accordingly to meet their corporate strategies.

## 2.4 Talent Capability Development – An Opportunity for Workforce Optimization through HR Analytics

As described in the introduction section, the HR domain practically covers a broad area of different modules to facilitate an employee's hire-to-retain journey. For this, it was observed that the application of contemporary HR analytics is only bound to a certain extent, and its prevailing use includes the development of HR dashboards, monitoring service delivery results, or predicting workforce needs and imminent exit cases. There is still a large uncharted HR territory that is yet to be explored via analytics especially talent capability development.

According to Ref. [17] training and professional development are some of the HR aspects that often gets overlooked, especially in smaller organizations where capability growth is perceived as a luxury and not a requisite. When being asked "What happens when you develop your staff and then they leave you?", Ref. [18] ingeniously answered with a second rhetorical question – "What happens when you do not develop them and then they stay?". Eventually, companies will have to pay the cost when organizational performance is impacted negatively due to their failure in upskilling and equipping their employees with the necessary competencies required to perform current and future jobs. This is very crucial especially in today's volatile business world with its ever-changing market dynamics and ever-increasing complexities.

Ref. [19] appraised the vital role that HR plays in addressing sustainability concerns and they concluded that employees are essentially the core contributors towards achieving organizational, social, and environmental sustainability. Therefore, proper training, mentoring and leadership pipeline should be in place to safeguard employee wellbeing and continuous advancement. Ref. [20] also demonstrated that how a firm can attain competitive advantage by establishing robust talent heterogeneity from the human resource perspectives, through building strong human capital as well as contextual capital in the organization, where the former element is formed by the talents of the company while the latter is constituted by their organizational and managerial processes such as culture and values. The underlying architecture proposed by them explained the different ways these two capitals will interact with one another. Then explored the performance which varyingly depending on a few key variables, including not only functional skills but also soft skills such as leadership, communication, decision making, negotiation, as well as creative and innovative thinking.

It is of utmost importance for an organization to make sure that the workforce can either meet or surpass the competencies and capabilities required to execute their daily jobs. HR learning and development can be the next realm where analytics can be applied to not only uncover hidden insights about employee performance but also reveal the foresight of future development needs to grasp the full benefits out of data available in HR and help achieve workforce optimization. A proper capability growth plan, matching employees to the right positions, and satisfying

their quest for knowledge and skills would support these achievements. Many possibilities still dwell in the HR domain and opportunities of maximizing the use of data through analytics and visualizations are to be further explored.

## 3. RECOMMENDATIONS & CONCLUSIONS

As HR evolves from the conventional employee administration which plays a more strategic role in the business, HR analytics becomes an important linkage that can bridge HR strategies for corporate outcomes. With the introduction of novel and advanced business analytics, most organizations have started to roll out analytics tools at a corporate level to inculcate analytical thinking and culture throughout all working layers to extract valuable insights. In this regard, HR is now undergoing a major transformation to take on a proactive role by transforming their vast amount of people data into knowledge. However, the journey of HR embarking on analytics is also met with similar challenges faced in other domains such as data quality issues, inefficient use of data, lack of analytical skills in the HR environment. Data quality is one of the main struggles that require prudent handling as data is essentially the input for all analytics work to take place. Improper processing of poor-quality data may lead to misinterpretations and formulation of the wrong strategies, eventually placing a company with no business if the impact is costly and irreversible.

Nonetheless, HR analytics has gained some ground in many businesses with its descriptive and predictive nature of applications due to the strong support from the leadership team and talents with the right skills. From the HR perspective, analytics has proved to be beneficial in 2 main modules, namely recruitment and exit management. For the use in recruitment, predictive models have been constructed in the talent sourcing and workforce planning environment to predict future manpower requirements, facilitate people-position matching activities based on personalities, aspirations, skills, and experience, as well as attract the right talent to the right job. On the other hand, HR analytics has also been put to good use through identifying employee needs and motivation levels followed by assessing their respective loyalty traits and predicting the likelihood of them leaving the organization. Consequently, a timely intervention plan can now take place to retain employees, especially top performers or staff possessing valuable skills, so that interruptions to the business operations can be kept at a minimum level.

In addition to the challenges identified, it has also been observed that HR is a right discipline that is awaiting analytics exploration and implementation in the contemporary digital era. This proposes a great opportunity to extend the application of advanced business analytics and visualization to these uncharted sectors. Particularly, talent capability development holds a greater prospect for integration with analytics as the workforce is a company's greatest asset who can steer the company towards success. This existing gap of not fully utilizing HR analytics to develop employee skills and competencies is found as a potential focus area in future research. HR is still taking its baby steps on this analytics journey and its potential can be realized by

having the right team, right talents, and right tools, leading this domain to achieve operational excellence, propel better decision making and enable more compelling stories with lasting impact to both the organization and the business world.

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