

## The Role of Big Data in Transforming HR Analytics and Talent Management Practices

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### Abstract

**Research Objective:** This study aims to reveal the use of BD in the technological development of HRA applications for TM management.

**Approach:** This study uses quantitative and qualitative methods. The quantitative method uses a differential test on the variable of BD usage. Furthermore, using the HRA system, the qualitative method uses descriptive analysis to manage TM.

**Research Findings:** The study's results indicate differences in HRA management before and after using BD. Through BD, HR can analyze data from work performance, feedback, supervision, and talent profiles filled out by employees. This can help HRA identify hidden skills and abilities of employees and help develop them. Employees who can develop their talents well can be valuable company assets.

**Originality:** This study is expected to empirically test the implications of using BD in HRA to manage TM in the company.

**Implications for practitioners:** This study can encourage companies that have not used BD to consider using it to manage their HR.

**Research limitations:** This study does not quantitatively test the effect of HRA on company performance but only uses the best practices of the companies that are respondents.

### Abstrak

**Tujuan Penelitian:** Penelitian ini bertujuan untuk mengungkap penggunaan BD dalam pengembangan teknologi aplikasi HRA untuk manajemen TM.

**Pendekatan:** Penelitian ini menggunakan metode kuantitatif dan kualitatif. Metode kuantitatif menggunakan uji diferensial pada variabel penggunaan BD. Selanjutnya, dengan menggunakan sistem HRA, metode kualitatif menggunakan analisis deskriptif untuk mengelola TM.

**Temuan Penelitian:** Hasil penelitian menunjukkan adanya perbedaan pengelolaan HRA sebelum dan sesudah penggunaan BD. Melalui BD, HR dapat menganalisis data dari kinerja kerja, umpan balik, supervisi, dan profil bakat yang diisi oleh karyawan. Hal ini dapat membantu HRA mengidentifikasi keterampilan dan kemampuan tersembunyi karyawan dan membantu mengembangkannya. Karyawan yang dapat mengembangkan bakatnya dengan baik dapat menjadi aset perusahaan yang berharga.

**Orisinalitas:** Penelitian ini diharapkan dapat menguji secara empiris implikasi penggunaan BD dalam HRA untuk mengelola TM di perusahaan.

**Implikasi bagi praktisi:** Penelitian ini dapat mendorong perusahaan yang belum menggunakan BD untuk mempertimbangkan menggunakannya untuk mengelola SDM mereka.

**Keterbatasan penelitian:** Penelitian ini tidak menguji secara kuantitatif pengaruh HRA terhadap kinerja perusahaan tetapi hanya menggunakan praktik terbaik dari perusahaan yang menjadi responden.

## Introduction

In facing increasingly fierce competition, companies must have a competitive advantage and sound innovation. The existence of the best and brightest human resources (HR) who can always work hard, develop their skills, and be able to compete in increasingly rapid technological advances is highly expected by the company. The existence of employees is essential to achieve the success of the goals to be achieved. Companies that have employees with talents that match the needs of the company will make the company superior and competitive [1]. In addition to screening the most potential human resources, companies also need to manage the development of employees within the company because employees are an asset and a major investment that the company has. Therefore, companies need to manage them well and involve them in the growth and development of the company. Employee productivity and loyalty are very important to encourage the company to grow more optimally. Companies can use a talent management (TM) system to increase productivity and employee loyalty.

Talent management (TM) was born and developed because of the war for talent phenomenon that occurred in companies in America in 1997, where many organizations were predicted to have difficulty in retaining the best people and would have difficulty in the recruitment process for potential employees and has high expertise due to increased competition and limited candidate offerings [2]. The increasing awareness of companies about talent today makes them compete to get highly talented employees, both by seeking from outside as well as from training and regeneration [3,4]. TM begins with identifying employees who have the right skills needed by the organization [5] and then there are the right employees with the potential and skills needed for the desired job.

TM is a system that provides an appropriate assessment of each company employee. With the results of this assessment, the company will know whether the employee has talent that can help the company achieve its goals or not [6]. The HR department constantly strives to ensure that its employees with the right skills and qualities remain with the organization for a long time. In the TM system, companies will not only be able to increase productivity but also be able to see and develop the talents of their employees. TM will be very beneficial for companies because it can track data at various points in the employee life cycle [4,7]. The number of TM system models that can be applied instead makes companies confused in determining the steps to be taken. Sometimes companies also choose the wrong system so it won't give maximum results.

To optimize TM, in-depth analysis that focuses on data is needed to study all processes, challenges, and opportunities in the workplace to achieve business success. This analysis method is known as HR Analytics (HRA). The term has actually been discussed for almost a decade. However, the development of technology and data has made this one thing even more popular. HRA is a new breakthrough as a guideline for HR management that will change the way organizational leaders manage HR and their functions in the future [8]. So that organizational leaders get comprehensive data analysis results from HR digital data to be able to predict and make decisions related to HR functions in the future. Based on research results, more than 70% of organizations and companies have started using HRA to integrate data into decision making. Basically, HRA is a practice of collecting and transforming data into insights to drive business success [9,10]. The information obtained from this process can be presented in the form of graphics, data visualization, or other forms that are easy for other stakeholders to understand.

The existence of data is a crucial factor in implementing HRA, but in fact, access to quality data is a problem for some organizations [11]. This statement is supported by research results which state that the hidden problem faced by many companies is data that lacks quality as a business support [12]. In addition to poor quality data management, many companies do not control information technology in the form of data and information processing software. What kind of data do companies really need in managing HR development in TM? Technological developments introduce us to Big Data (BD). BD is basically a bunch of structured, semi-structured and unstructured data that is continuously flowing through various media [13]. BD seems to be a must for every company that wants to achieve competitive advantage.

The use of BD in HRA allegedly can predict productivity [14]. The optimal combination of using tools or software allows companies to hire capable individuals, and provides the motivation and opportunity to do a good job. However, based on research results, the more popular the use of HRA, the more dilemmatic business opinion is towards it. Many companies consider HRA to hurt their business. This opinion arises from businesses that have difficulty competing with other businesses whose functional base already includes analytics [15]. Many researchers focus on the role of HRA in the human resource function [16–18], but have not explained the use of BD in relation to technological developments in HRA applications for TM management. So, research on the use of BD in HRA needs to be done.

### **Statement of Problem**

Based on the background, this study will discuss the role of BD as an HR analysis tool in TM. In doing so, we formulate a research agenda, proposing new directions for empirical studies to advance our scientific knowledge of TMs. To achieve this goal, we use applied research and quantitative analysis methods to review the importance of BD in HRA in TM management. Then, results are presented highlighting emerging perspectives from the study and describing the contribution of BD in TM. Finally, we present conclusions and suggestions.

### **Research Objectives**

This study aims to reveal the use of BD in relation to technological developments in HRA applications for TM management. The urgency of this research is basically to find out the implementation of companies that have used BD in HRA to manage TM optimally. Not all companies are able to manage simple data or BD in general HR management effectively. This research will be very useful for companies just starting to use BD in HRA and those just starting an HRA system.

### **Method**

This study uses a mixture of quantitative and qualitative methods. The quantitative method uses a differential test on the variable use of BD, which compares the company's condition before and after using BD in the HRA. Furthermore, qualitative methods use descriptive analysis based on the results of in-depth interviews with HR managers or equivalent in managing TM using the HRA system.

The population that will be used in this study is all companies in Indonesia that have used BD in corporate decision-making. The sample at this company uses the formula from Lemeshow because the population size is unknown or infinite. Based on this formula, the  $n$  obtained is  $96.04 = 100$  people, so this study will take data from a sample of at least 100 people.

Respondents' responses in this study were measured using an interval scale with a value of 1 to 5 for all variables, namely before using BD and after using BD. The data in this study are primary data, which the researchers obtained directly from the respondents through questionnaires and data from interviews with informants. The hypothesis in this study is:  
Ho: There is no difference in the management of HRA before using BD and after using BD  
Ha: There are differences in the management of HRA before using BD and after using BD

**Table 1.** Variability Test Result

No	Question	Before Using BD	After Using BD
1	Speed of employee data collection process	0.308	0.285
2	Speed of processing employee data	0.336	0.543
3	Speed of decision making	0.281	0.347
4	Ease of decision making	0.450	0.462
5	Broad scope of employee management	0.306	0.559
6	Accuracy of data collection	0.124	0.447
7	Accuracy of decision making	0.258	0.464
8	Optimization of decision making	0.072	0.413
9	Quality, performance, productivity, and effectiveness of work results	0.222	0.338

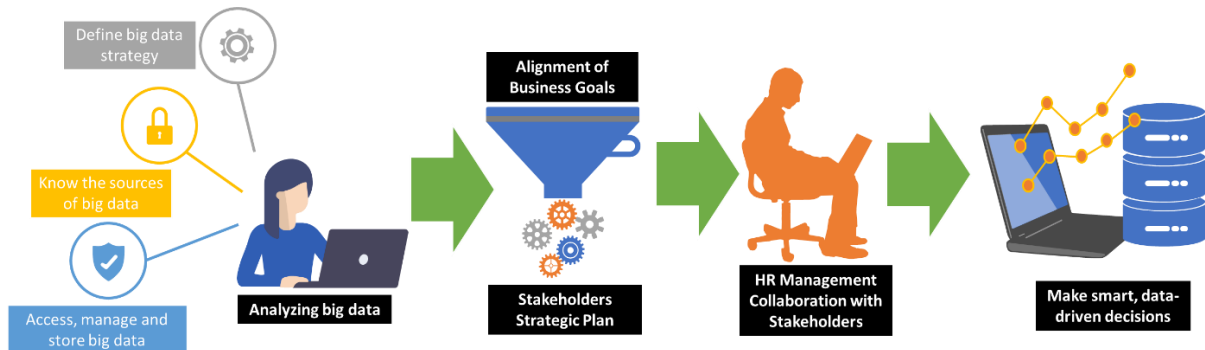
Source: author data (2023)

All variables before and after using BD are valid. The variable reliability test result is 0.790, which means the test is reliable.

## Results and Discussion

### Use of Big Data in HR Analytics

We know that the current digital era, where technological evolution can disrupt (disruptive technology) companies that are currently advanced and innovations that continue to develop, make the global market very competitive in creating new technologies. For the survival and growth of companies, it is inevitable that they must be more adaptive and responsive to change. To be able to win this disruptive era, people who are ready for future changes are indispensable resources. Therefore, a comprehensive and appropriate HRA is needed according to the current era. HRA cannot be carried out properly without being supported by data, one of which is BD.



**Figure 1.** Decision Making Process with Big Data

Source: author data (2023)

Figure 1 provides an overview of the decision-making process using BD. With BD technology, companies can collect and analyze HR data from multiple sources, and use it to generate insights that help them make better and more informed business decisions. However, keep in mind that successful use of Big Data requires investing in the right technology, skills, and strategies. In an increasingly data-driven business world, data-driven decision-making is no longer an option, but a necessity. By leveraging BD, companies can gain competitive advantage, improve performance, and achieve sustainable growth.

**Table 2.** Paired Samples Test Result

	Mean	Std. Deviation	Std. Error	Paired Differences		t	df	Sig. (2-tailed)
				95% Confidence Interval of the Difference	Lower			
Pair 1 Before_BD - After_BD	-16.40000	5.44949	.54495	-17.48130	-15.31870	-30.095	99	.000

Source: author data (2023)

Based on the results of statistical testing, a significance result of 0.000 was obtained, which means it is less than 0.05, so it can be concluded that there are differences in HRA management before using BD and after using BD. Previous studies have also indicated that BD can contribute in providing insight into various human capital management within companies [19,20]. Each employee turnover will be formed into a data that can identify the characteristics of employees and the dynamics of a field of work. From this data, then HR can make decisions about how to develop the skills that the company's HR has and make SOP work arrangements.

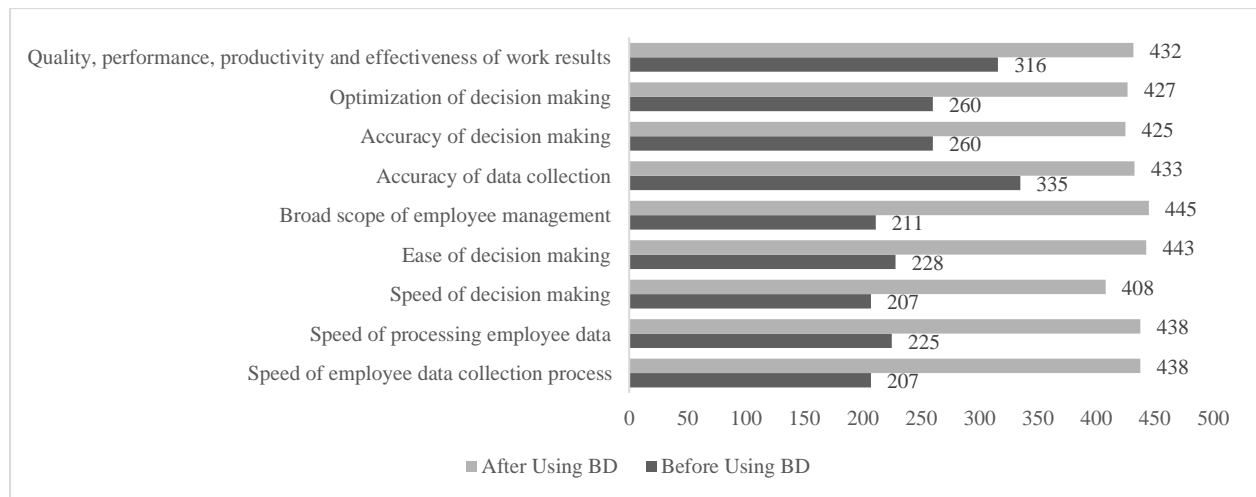
**Table 3.** Paired Samples Statistics Result

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Before_BD	22.4900	100	4.50476	.45048
	After_BD	38.8900	100	3.70066	.37007

Source: author data (2023)

From table 2 the results of the paired sample test contain information about the mean paired differences of -16,400. this value shows the difference between the average HRA management value before using BD and the average HRA management value after using BD or  $22.4900 - 38.9000 = -16.4000$  (table 3) and the difference between these differences is between -17.4813 to -15.3187. In table 2 it is also known that the t count is negative, which is equal to -30,095, which means that the average value of HRA management before using BD is lower than the average value of HRA management after using BD.

The results of this study are supported by other studies which find that companies that are unable to find and develop human resources with hidden talents are a loss for the company. Through BD, HR can analyze through collected data both through work performance, feedback, supervision, and talent profiles filled out by employees. With this, HRA can identify hidden skills and abilities of employees and help develop them. Employees who can develop their talents properly can become a valuable company asset.



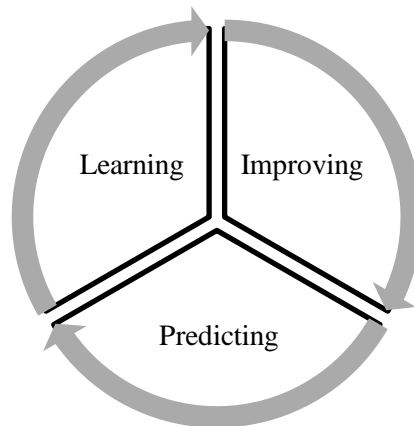
**Figure 2.** Questionnaire Results

Source: author data (2023)

In the results of processing the questionnaire (figure 2), respondents' responses regarding the speed of data collection, employee data processing, and decision making, were faster when the company had used BD. Companies can optimize the recruitment process thanks to BD. Because it allows HR to collect, store, filter, evaluate CVs from tens to thousands of candidates, to schedule interviews more quickly. As a result, HR performance is more effective and efficient.

The company's ease in making decisions related to HR is also considered to be faster after using BD. BD is also a means for HR to review ineffective, less effective, or effective performance. If there is ineffective performance, the HR team can easily decide on strategies to improve performance. Ease of decision making through BD analysis also allows HR to inform as well as educate leaders, from the supervisor level to the director. If the leaders understand the conditions (based on the data) it will affect decision making and the future of the company.

The scope of employee management is considered wider after using BD. One of the companies interviewed stated that it uses BD to manage survey results in order to increase employee engagement, identify employees who are demotivated, or are facing performance issues. In addition, in these companies BD is used to reward employees who achieve targets and provide advice to managers about potential employees for training or promotions. The broad scope of the company's HR management provides opportunities for employees to grow and develop by learning, improving their performance, and predicting the company's growth (figure 3).



**Figure 3.** Scope of the company's HR Management

Source: author data (2023)

The accuracy of data collection and decisions is also considered better after using BD. Decisions taken are related to labor and support the company's plans. For example, after HR reviews the existing data, then the team will convey it to the relevant team. Then the team makes a work plan, determines how to work, distributes tasks, and tracks employee attendance.

Having access to and using BD is considered to further optimize decision making. BD enables HR to improve communication between employees [21,22], support mentoring and training [23], develop transparency [24], predict future employment issues, and more. All these efforts lead to the employee's work experience. If employees have pleasant work experiences, HR can easily retain them and predict employees who will leave.

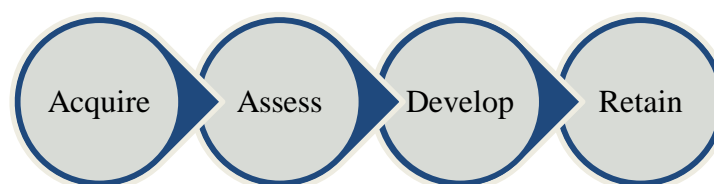
The quality, performance, productivity, and effectiveness of the analysis results through BD are considered better than traditional data. Performance metrics are one of the most common uses of BD in HRA, and one that has assisted HR managers in increasing employee productivity. With the help of BD, HR professionals can measure employee performance and improvise on the working conditions of their employees. Performance metrics can help further by measuring high performers and evaluating low performers so that action can be taken to

help increase their productivity. Companies can also identify and reward employees who have the best performance. In addition, BD is useful for being able to provide information about employees related to performance problems they face, such as whether company employees need various kinds of training to improve their performance or need some additional resources so that work can be done more optimally.

### 3.2. HR Analytics in Talent Management

Basically, business decisions related to structural change or company development originate with proper HRA. While HR has the data to support the company's performance. In the recruitment process, BD in HRA can have a tremendous impact in helping to recruit the best talent [25]. HRA can provide the hiring manager with the information needed to narrow down patterns that lead to the best candidates in the job market [26]. HRA helps in mapping out the skills set according to the organization's strategy [16,18], thus ensuring that the candidates who come for the interview are the ones who are most suitable for the roles required by the company. Based on the results of interviews with respondents, the application in companies that can be done is for example combining HRA with tools such as the Applicants Tracking System (ATS) to be able to carry out an unlimited number of screening processes more effectively and efficiently in order to find the most suitable candidates.

HRA offers greater ability for employers to study past hiring results and ensure that future hires can do better [27]. From HRA, hiring managers can find patterns that can be used to attract, recruit, and retain employees in the company. After being equipped with visibility and knowledge about what strategies have been successful and what strategies still need to be evaluated, HR professionals can work better in finding solutions to existing company problems, improving strategies, and maintaining optimal strategies.



**Figure 4.** Talent Management Pillars

Source: author data (2023)

There are four pillars in TM (figure 3), namely:

1. Acquire is the phase in which the company carries out company promotions, search, recruitment, and employee orientation.
2. Assess is the phase of assessing and analyzing the condition of human resources in the company. Companies can analyze the capabilities and potential of each employee as well as employment conditions in the company.
3. Develop is the phase in which the company implements a strategy to develop HR capabilities and the company's situation.
4. Retain is a phase when the company implements a strategy to maintain the performance and number of employees, especially those who contribute positively to the company.



One of the pillars present in the talent management system itself is development. That way, existing employees have the opportunity to continue to develop through various existing programs. Through various development programs and a comfortable work culture, it will certainly increase employee satisfaction. Of course, this will have implications for the company's performance.

Besides being able to increase satisfaction, the existence of talent management can also strengthen the bonding between employees and the company. That way, their work ethic and team work can be further improved. Of course, the main purpose of this system is to support the company's performance even better. Starting from preparing qualified candidates to maintaining quality employees are company tips to improve their performance.

#### **4. Conclusion**

Data is the most credible and powerful source of knowledge. The use of BD in companies can provide insights that can influence steps in achieving company goals. In relation to HR management, BD plays a role in providing data to be processed in HRA for various TM management decisions such as recruiting candidates, increasing employee productivity, measuring employee satisfaction, and retaining the best employees. The use of BD in HRA can provide areas that provide the greatest profit opportunities, form a comfortable corporate culture, good employee experience, to have a positive impact on the company more broadly.

This study focuses on analyzing the use of BD in HRA to manage TM, but the analysis process does not quantitatively examine the influence of HRA on company performance, but only uses the best practices of companies that are respondents. In practice, this research is able to encourage companies that have not used BD to consider using BD in managing their company's HR. Suggestions for future researchers are to test the effect of HRA on company performance quantitatively and to analyze risk management on BD and HRA.

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