



BIG DATA ANALYSIS IN HUMAN RESOURCES DECISION MAKING: OPTIMIZING WORKFORCE MANAGEMENT

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ABSTRACT

This research aims to conduct an in-depth analysis of the application of Big Data in human resource decision-making, focusing on optimizing workforce management. By measuring four main variables, namely recruitment efficiency, employee selection accuracy, employee development, and organizational performance based on HR decision-making—Big Data analysis is expected to provide a deeper understanding of workforce dynamics. This research uses qualitative methods with the help of the NVivo 12 Plus tool to identify research results. The application of Big Data in various aspects of human resource management is recognized as a catalyst for positive change in workforce management. The research results show that applying Big Data can build recruitment efficiency, increase employee selection accuracy, support more appropriate employee development, and ultimately improve overall organizational performance. Big Data makes organizational performance based on HR decision-making by providing a solid foundation for more effective human resource management strategies.

INTRODUCTION

In this digital era, the business and human resources world faces increasingly complex and dynamic challenges (E. Wang, 2023). Workforce management is becoming a key focus for organizations seeking to understand, optimize, and manage their human resources more effectively (Halim et al., 2022). In this context, Big Data emerges as a promising solution to improve human resources (HR) decision-making by providing deep insights based on large-scale and complex data analysis (Gravili et al., 2023). Big Data, which refers to large, diverse, and high-velocity data volumes, offers new opportunities to detail and understand workforce dynamics holistically (Xie, 2020). By leveraging technology and advanced analytical methods, organizations can optimize workforce management, understand employee trends, and design more responsive HR policies (Chen & Yang, 2021).

This research aims to conduct an in-depth analysis of how the application of Big Data can change the decision-making paradigm in the HR context (Jia et al., 2020). The focus lies on Big Data's ability to provide relevant and accurate information to assist organizations in recruitment, employee development, performance evaluation, and employee welfare management (L. Xu, 2022). Through in-depth data mining, this research will explore the potential of big data to provide better insights related to workforce needs, talent identification, and increasing productivity. Thus, this research aims to contribute to the practical and theoretical understanding of how Big Data can be integrated into HR policies and practices, positively impacting overall organizational performance.

By taking a deeper look at the role of Big Data in optimizing workforce management, this research is expected to provide a solid foundation for better strategic decision-making at the organizational level, supporting

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sustainability, efficiency, and competitive advantage in the ever-evolving world of work. Effective human resource management has become the key to corporate success amidst increasingly fierce global competition (Nocker & Sena, 2019). Big Data is not only seen as a technological tool but as a strategic resource that can provide a deep understanding of complex aspects of organizational life (M. Wang, 2020).

This research will also explore the challenges and opportunities that organizations may face. A deep understanding of data security, ethics, and privacy is an important aspect that needs to be considered in the application of Big Data, especially when it involves sensitive and personal information of employees (Zeng, 2021). This research also pays attention to the role of current technologies such as artificial intelligence (AI) and predictive analysis, which are increasingly integrated with Big Data to create more sophisticated solutions in supporting human resource decision-making (Popovič et al., 2018). Comparison and evaluation of these methods will provide greater insight into the capabilities of current technologies in the context of workforce management (Kamble et al., 2023).

This research aims to conduct an in-depth analysis of the application of Big Data in human resource decision-making, focusing on optimizing workforce management. This research will measure four main variables: recruitment efficiency, accuracy of employee selection, employee development, and organizational performance based on HR decision-making (Jain, 2018). Big Data analysis can provide a deeper understanding of workforce dynamics, improve the recruitment process, increase the accuracy of employee selection, support more appropriate employee development, and ultimately improve overall organizational performance (Martins et al., 2022).

The results of this research will provide a clearer view of the contribution of Big Data in optimizing workforce management, strengthening existing HR policies, and providing a foundation for future data-based initiatives. The conclusions and recommendations from this research can serve as a guide for HR practitioners, organizational leaders, and researchers in utilizing the potential of big data to achieve corporate strategic goals and improve the sustainability of human resources.

LITERATURE REVIEW

The introduction of Big Data in the context of human resource management (HR) has changed the decision-making paradigm in the business world (Okruhshko et al., 2023). In recent years, discussions about the collection of large and complex data have grown, highlighting the crucial role of Big Data in improving the effectiveness of HR policies (Klein et al., 2023). Big Data in HR can include analysis of personnel transaction data, performance data, and other data to understand employee behavior and improve the effectiveness of HR policies (Song & Ullah, 2023). Big Data significantly contributes to employee recruitment by improving selection methods (Kumar et al., 2021). Big Data analytics can identify employee success patterns, predict future performance, and provide deep insight into the candidate characteristics that best suit an organization's needs (Bai, 2022).

Employee development also benefits from the application of Big Data (Popova et al., 2021). Big Data analytics can provide deeper insight into employee training and development needs, enabling organizations to design more appropriate and relevant programs (Xiang et al., 2022). However, along with its positive potential, the application of Big Data in HR also faces challenges that must be considered (Yang, 2022). Data security, employee privacy, and ethical issues must be addressed (Nguyen et al., 2022). Clear policies and ethical frameworks are needed to ensure the responsible use of Big Data in HR (Karim et al., 2021). The results of the 2018-2024 Scopus database analysis from the Vosviewrs analysis results are in Figure 1 below.



Figure 1. Vosviewrs Big Data Analysis in Human Resources Decision-Making
Source: Data processed by author (2024)

This literature provides a broad and in-depth knowledge base on the role of Big Data in HR, focusing on recruitment, employee development, performance evaluation, and welfare management (Jain, 2018). This research will develop these concepts further and explore the potential of applying big data to optimize workforce management comprehensively. Integrating artificial intelligence (AI) and predictive analytics is the next trend in using Big Data in HR (Todolí-Signes, 2019). Combining Big Data with AI can provide more adaptive and predictive solutions, helping organizations respond more quickly and effectively to labor market dynamics (Sabitha Malli et al., 2018).

RESEARCH AND METHODOLOGY

This research aims to conduct an in-depth analysis of the application of Big Data in human resource decision-making, focusing on optimizing workforce management. This research measures four main variables: recruitment efficiency, employee selection accuracy, employee development, and organizational performance based on HR decision-making (Jain, 2018). Big Data analysis is expected to provide a deeper understanding of workforce dynamics, improve the recruitment process, increase the accuracy of employee selection, support more appropriate employee development, and ultimately, improve overall organizational performance. This research is qualitative research by describing research results assisted by the NVivo 12 Plus tool in identifying research results. Crosstab Query in NVivo 12 Plus is used to analyze the relationship between various aspects of human resource management (HR), such as Recruitment Efficiency, Accuracy of Employee Selection, Employee Development, and Organizational Performance Based on HR Decision Making. The results can then be expressed as a percentage. Crosstab Query interprets the results to understand how these variables relate to each other and provides deep insight into how aspects of HR influence each other and support better decision-making in human resource management.

RESULT AND DISCUSSION

The role of Big Data Analysis in the context of Human Resources Decision Making is to optimize workforce management (Niu et al., 2021). This research focuses on four key variables: Recruitment Efficiency, Accuracy of Employee Selection, Employee Development, and Organizational Performance Based on HR Decision Making. This research aims to dig deeper into how the application of Big Data can positively impact HR management strategies, create a more efficient recruitment process, ensure optimal employee match, improve employee development, and ultimately support an increase in the organization's overall performance. Big Data refers to large, diverse, complex volumes of rapidly generated data from various sources, such as sensors, mobile devices, social media, business systems, etc (Duan et al., 2019). Big Data involves collecting, storing, analyzing, and processing this vast and diverse data (Nisar et al., 2021). The results of the NVivo 12 Plus Crosstab Query analysis are in Figure 2 below.

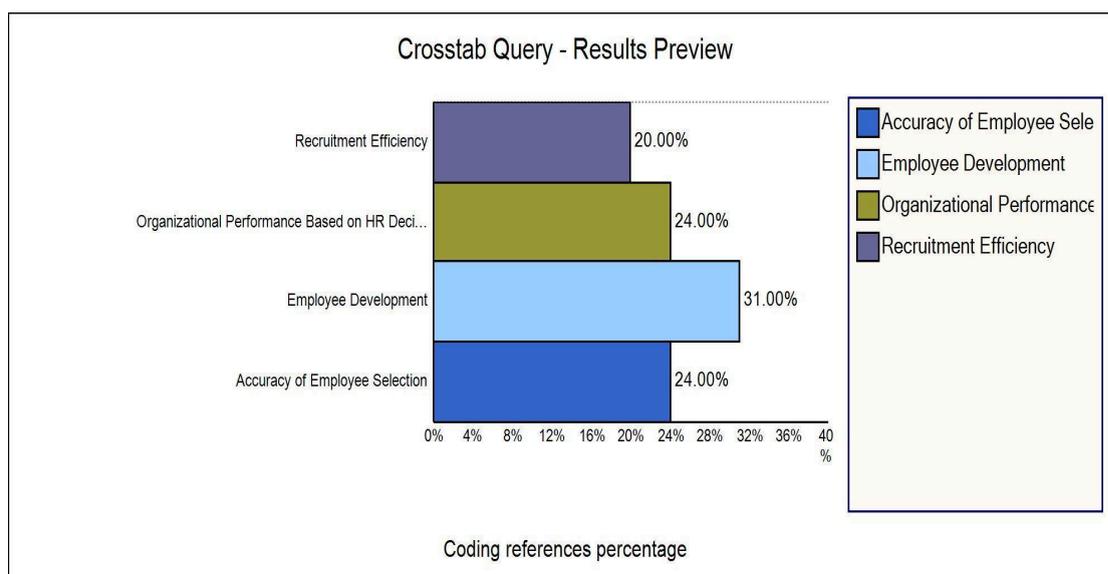


Figure 2. Nvivo 12 Plus Crosstab Query Analysis Results, 2024
Source: Data processed by author (2024)

The results of the NVivo 12 Plus Crosstab Query analysis show that the application of Big Data positively impacts various aspects of human resource management (HR). In recruiting efficiency (20.00%), Big Data helps build efficiency by identifying employee success patterns, predicting candidate suitability more precisely, and detailing the most suitable characteristics. Employee selection accuracy (24.00%) is improved through in-depth

analysis of performance data and individual characteristics, giving organizations richer insight into each candidate and increasing the accuracy of predictions on potential candidates. In employee development (31.00%), Big Data provides deep insight into individual training and development needs, supports developing programs that suit employee needs and aspirations, and creates a progressive learning environment. Organizational Performance Based on HR decision-making (24.00%) is strengthened by Big Data, providing a solid basis for more effective HR management strategies. The application of Big Data predicts trends, identifies successful performance patterns, and helps organizations refine their HR strategies. The holistic application of Big Data can improve recruitment efficiency, accuracy of employee selection, employee development, and organizational Performance based on HR decision-making. Integrating Big Data in HR management helps organizations achieve larger business goals through more accurate decision-making and optimized strategies.

Recruitment Efficiency

The application of Big Data in Human Resources Decision Making is expected to build recruitment efficiency by identifying employee success patterns, predicting more precise candidate suitability, and detailing the most suitable characteristics, thereby increasing the effectiveness and accuracy of the selection process (Adrian et al., 2018). Analyzing big data related to recruitment history and using Big Data technology can help organizations identify human resources that best suit the company's needs and culture (Fauzi et al., 2023). This information provides a deeper understanding of the factors that contribute to employee success so that companies can direct recruitment efforts in a more targeted manner.

Big Data allows the creation of predictive models that can predict the performance of prospective employees based on the data that has been collected (Kavre et al., 2022). With this approach, the recruitment process becomes more efficient in finding suitable candidates and can reduce the risk of a mismatch between the employee and the desired position (Kels & Vormbusch, 2020). Therefore, Big Data in Human Resources Decision Making opens the door to recruitment efficiency and increases accuracy in selecting individuals who can have a positive and sustainable impact on organizational development (D. Xu et al., 2022). Utilizing in-depth information generated by Big Data, companies can build a recruitment foundation that is effective, adaptive, and oriented toward long-term success (Johnson et al., 2021).

Use of predictive analytics to identify candidates with the potential for significant growth and contribution in the future (Jain, 2018). By including various data such as educational history, work experience, and skills test results, Big Data systems can help detail the profile of prospective employees with a higher degree of accuracy (Roumell & Roessger, 2019). Enhanced recruitment efficiency by Big Data can also be reflected in reducing the time required to complete the recruitment process (Li & Lv, 2021). With careful data analysis, organizations can identify the most effective search sources, develop targeted recruitment strategies, and respond to workforce needs more quickly (Oswald et al., 2020). The importance of recruitment efficiency lies in saving time and resources and the organization's ability to attract and retain the best talent (Glennie et al., 2023). Applying Big Data in Human Resources Decision Making helps achieve recruitment efficiency (Alan, 2023). It can increase an organization's competitiveness in recruiting the best individuals to support long-term growth and sustainability.

Along with developments in science and technology, the recruitment process for millennial employees has yet to be carried out conventionally (Scali & Stone, 2023). HR management of employee recruitment is currently carried out by utilizing big data (Nicolaescu et al., 2020). In this case, big data makes HR management easier because employee data is collected, organized, and analyzed quickly (X. Wang & Zhang, 2022). Interestingly, the recruitment process takes place more objectively by using big data (Hoang et al., 2018). Cloud-based big data platforms can play an essential role in improving HR management during the employee recruitment process (Ni, 2022). This cutting-edge technology in the HR field can analyze and categorize various data flows in large amounts (Gomathi et al., 2023). The HR management team can utilize the information to compare the criteria of each applicant more quickly. That way, companies can find the best employee qualifications during recruitment.

Big data provides data optimization features that the HR team can access in a company during the employee recruitment period (P. Sharma & Khan, 2022). Based on these data, the HR team also has the power to calculate comparisons with competitors in terms of salary, benefits, and expectations for future career paths (E. Wang, 2023). Using big data, can dig up the most profound information to make it easier for companies to find the best quality employees (Halim et al., 2022). Big data can determine which applicants have the right to pass the following recruitment process and the existence of big data can reduce the possibility of collusion and nepotism in a company (Konovalova et al., 2021).

Utilizing extensive data analysis in the employee recruitment process can speed up finding the best talent that matches the company's qualifications (Gravili et al., 2023). HR doesn't deal with big data or have access to much data to analyze (Xie, 2020). However, this situation is changing as many companies realize the importance of big data in various aspects of human resource management (L. Xu, 2022). Big data has great potential to change the entire HR management system (Madhala et al., 2018). With big data, HR can analyze essential factors in employee management and make more accurate decisions (Yang, 2022). From the recruitment process and human resource development to maintaining vital company operations, extensive data significantly influences various fields related

most effective learning format, or crafting a career path that suits employee goals and aspirations (Gan, 2020). By building employee development through Big Data, organizations can create an environment that supports professional and personal growth (Panagou et al., 2021). Careful application of the insights provided by Big Data can help shape a progressive learning culture and ensure that investments in employee development produce significant positive impacts (Ferket, 2019). Using big data, companies provide opportunities for employees to grow and develop through learning, improving performance, and predicting company growth (Hotaling & Spinrad, 2021). For example, Google uses people analytics to invest in their infrastructure better, answer critical questions that matter to the business, and as an essential component in building business partnerships (Wongburi & Park, 2021). The analytical capabilities possessed by Big Data can help identify human resources who have the potential to grow and develop rapidly so that they are entitled to further training so they can get a high career path (Jain, 2018). This won't be easy to do manually and can take a long time. Therefore, using big data is very influential for a company (Azman Shah et al., 2021).

The NVivo 12 Plus Crosstab Query analysis results show that the application of Big Data significantly positively impacts various aspects of human resource management (HR). From these results, the employee development percentage reached 31.00%, indicating the most significant contribution from applying Big Data. Several key factors can explain this. First, Big Data provides deep insight into the training and development needs of individual employees, enabling the identification of the skills required to improve performance (Chen & Deng, 2023). Furthermore, the data supports developing programs that suit employee needs and aspirations, creating a progressive learning environment (Gravili et al., 2018). With the information obtained, organizations can better help employees achieve their maximum potential, increasing productivity and job satisfaction (Okrushko et al., 2023). Big Data analytics also allows measuring development results by involving data-driven development and adapting strategies based on successful trends (Molina-Granja et al., 2022). Integrating Big Data in employee development supports individual growth and contributes significantly to overall organizational performance through more accurate decision-making and optimal strategies (Nocker & Sena, 2019).

Organizational Performance Based on HR Decision Making

Applying Big Data in Human Resource Decision Making can build organizational performance based on HR decision-making by providing a solid basis for human resource management strategies that are more effective, adaptive, and oriented toward business goals (Azman Shah et al., 2021). By analyzing big data related to employee performance, satisfaction, and operational efficiency, organizations can make more intelligent and more informed HR decisions (Bai, 2022). Big Data enables a deep understanding of performance factors, enabling more informed decisions regarding employee placement and development (Nocker & Sena, 2019).

Big Data can be used to predict trends and identify successful performance patterns (Kels & Vormbusch, 2020). Organizations can optimize HR decision-making strategies by understanding the factors that contribute to employee success, including placement, promotion, and career development (Fauzi et al., 2023). The application of Big Data can provide better insight into the impact of HR decisions on overall organizational performance (Jain, 2018). By monitoring and evaluating the results of decisions based on data, organizations can continually refine their HR strategies to achieve larger business goals (Ferket, 2019). Thus, Big Data in Human Resources Decision Making builds organizational performance and creates a solid foundation for overall corporate sustainability and growth (Barrett & Greene, 2023). The results of the Treemap analysis with NVivo 12 Plus are in Figure 5 below.

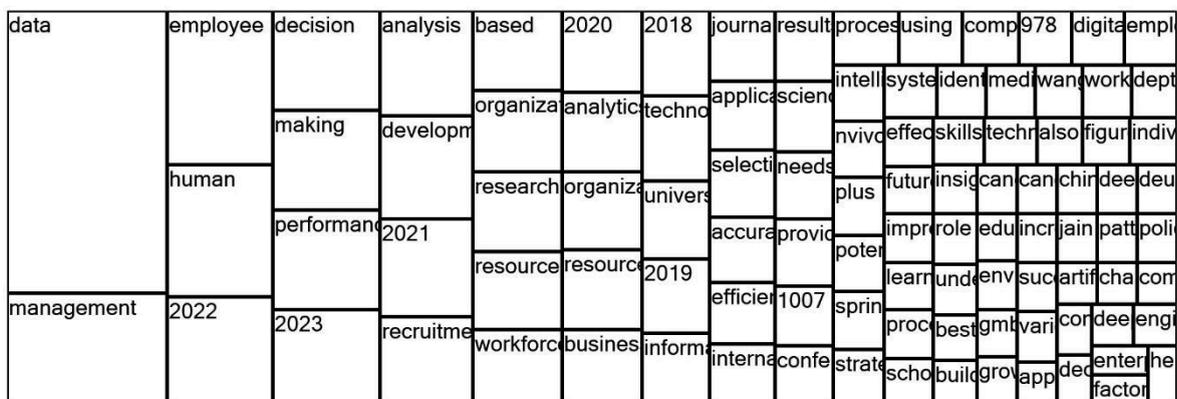


Figure 5. NVivo 12 Plus analysis by Tree Map
Source: Data processed by author (2024)

The results of the NVivo 12 Plus by TreeMap analysis show that by Leveraging the insights provided by Big Data, organizations can dynamically adjust their HR strategies to respond to changes in workforce needs and

market demands. This increases operational efficiency and allows organizations to remain leaders in their industry (Alan, 2023). Big Data supports the development of more proactive HR decision-making strategies (Gedam et al., 2023). By continuously analyzing data, organizations can identify opportunities for innovation in workforce management, optimize organizational structures, and design policies that support sustainable growth (Luo et al., 2022). Big Data is not only a tool for understanding organizational performance but also a catalyst for building an adaptive, influential, and data-based decision-making culture at all levels of the organization (Barykin et al., 2020).

HR can use survey results to increase employee engagement and identify employees who are losing motivation or facing performance issues. Besides that, big data rewards employees who achieve targets and provides suggestions about employee potential for training or promotion (Y. Wang & Li, 2023). Big data can provide insight into human resource management in companies (Nocker & Sena, 2019). Every time there is a change of employee, the data will explain the characteristics of the employee, as well as what changes have occurred in their work (Okrushko et al., 2023). Then, HR can use this data as a basis for making decisions. Mainly related to developing company HR skills and creating work SOPs (Kels & Vormbusch, 2020).

CONCLUSION

The application of Big Data builds recruitment efficiency by identifying employee success patterns, predicting more precise candidate matches, and detailing the most appropriate characteristics. Big data analytics help organizations direct recruiting efforts in a more targeted manner, increase the effectiveness of the selection process, and reduce the risk of a mismatch between employees and desired positions. Big Data builds employee selection accuracy by deeply analyzing performance data and individual characteristics. By using Big Data, organizations can gain richer insights about each candidate, increase the accuracy of predictions about candidates who have the potential to make maximum contributions and build strong and productive work teams. Big Data builds employee development by providing deep insight into individual training and development needs. Data analysis can create development programs that can be tailored to employee needs and aspirations with more precision, create a progressive learning environment, and ensure that investments in employee development produce significant positive impacts. Big Data builds organizational performance based on HR decision-making by providing a solid foundation for more effective human resource management strategies. The application of Big Data predicts trends and identifies successful performance patterns so organizations can continually refine their HR strategies to achieve larger business goals. Applying Big Data increases the accuracy of employee selection and creates a solid and productive team. Although they bring benefits, challenges such as privacy issues, risk-biased algorithms, implementation complexity, and non-compliance with technology and policy changes must be addressed with risk and compliance management. Future research needs to optimize critical aspects to optimize the benefits of Big Data in human resource management. Appropriate policy and ethical measures are required to balance benefits and risks, enabling organizations to achieve efficiency, employee development, and business goals more effectively.

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