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THE ROLE OF BIG DATA PREDICTIVE ANALYTICS AS A MEDIATOR OF THE INFLUENCE OF RECRUITMENT AND SELECTION, REMUNERATION AND REWARDS, TRAINING, AND DEVELOPMENT ON EMPLOYEE RETENTION

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PAPER INFO	ABSTRACT
	The purpose of this study was to determine the effect of recruitment and selection, remuneration and rewards, as well as training and development on employee retention mediated by the big data predictive analytics variable. The method in this study uses a quantitative method which is an approach, an assessment based on numbers using statistical calculations. The samples in this study were employees of PT Addis Citra with a total of 145 respondents. The data collection technique used in this study was a questionnaire or questionnaire. While the data analysis in this study used the Structural Equation Model (SEM) with the AMOS 26 program. The research results obtained show that the variables of recruitment and selection, remuneration and rewards, and training and development have an effect on big data predictive analytics. Furthermore, big data predictive analytics variables affect employee retention, and big data predictive analytics has a mediating role in influencing recruitment and selection, remuneration and rewards as well as training and development on employee retention. **Keywords:** Recruitment and Selection; Remuneration and Rewards; Training and Development; Big Data Predictive Analytics; Employee Retention

INTRODUCTION

Human resources play a key role in any organization's performance and are vital assets for an organization (Reb et al., 2019). To manage these assets effectively, management strategies are used in various sectors around the world (Cappelli, 2000). Effective practices in human resource management (HRM) play an important role in staff retention and tend to improve job security (Irshad & Afridi, 2007). Employee retention is considered one of the important human resource functions. Retaining employees is an important activity that helps organizations gain a competitive advantage (Paillé, 2013).

A survey conducted by mckinsey.com in 2021 related to employee retention in several countries such as Australia, Canada, Singapore, the United Kingdom, and the United States shows that there are around 40% of employees state that it is somewhat possible to leave the company where they currently work in the next 3-6 months. Moreover, this trend may persist even greater than in previous years, with 64% expecting this problem to continue or worsen over the past 34%. The next 6 months. About 64% of employees who decide to resign from the company where they previously worked in the next 3-6 months do not even have or get a replacement job, this survey was conducted with 1,960 respondents.

Big Data Predictive Analytics (BDPA) is needed by companies for data-driven decision-making and sophisticated applications (Bag et al., 2021). Big Data Predictive Analytics (BDPA) is a new suite of technologies that can store and process data by volume a very large range of different types of data in real time and at a lower cost (Bag et al., 2021). BDPA can be said to be the integration of data and technology that accesses, integrates, and reports all available data by filtering, correlating, and reporting information and insights that cannot be accommodated with past data technologies. According to Marsden and ICF GHK (2013), BDPA is an emerging phenomenon, reflecting a higher dependence on data in terms of volume growth, variety, and speed.

There are several factors that affect employee retention namely training and development (Renaud et al., 2015), compensation and benefits Rambur et al., (2005), the balance between work-life balance (Parkes & Langford, 2008), career development (Khan, 2014), supportive work environment (Ghosh & Sahney, 2011), organizational commitment (Bulut & Culha, 2010), attractive work environment (Thakur & Bhatnagar, 2017), organizational culture, and corporate values (Hatch & Schultz, 2008).

PT Addis Citra is a company engaged in digital communication with several core businesses in it including production house (PH), social media management, event organizer (EO), community platform, and ads ops. Addis Citra was established in 2015, until now the company has employed more than 100 employees with permanent and non-permanent status. Problems related to employee retention have been experienced by this company more precisely in 2019, where at that time the company could not manage its employees properly, this is characterized by the large employee turnover rate in this company of around >15% in one year, this condition is caused by the poor recruitment system which causes the company to be less precise in identifying the best candidates, In addition, there is still no human resources information system (HRIS) that can support the company's operational activities. Other factors such as a poor rewards management system and lack of training and development also contribute to increased turnover in the company. Therefore, researchers are interested in conducting research related to what factors can affect employee retention in this company.

Literature Review

Definition of Recruitment and Selection

Recruitment is the process by which the organization looks for potential applicants to fill a position or job. Selection refers to the process by which the company tries to identify applicants with the necessary knowledge, skills, abilities, and other characteristics that will help the company achieve its goals. Companies that have different strategies also require different types and numbers of employees. Thus, the strategy pursued by the company will have a direct impact on the type of employees it wants to recruit and select (Noe et al., 2006).

According to Mardianto (2014), recruitment and selection are defined as a process to get prospective employees who have abilities in accordance with the qualifications and the needs of an organization/company. Naheed and Amir (2012) explained that recruitment is a process of finding people who are considered right for a job. Every job in the business field requires the ability and quality of good staff as an added value for the company. Meanwhile, according to Omolo, Oginda, and Oso (2012), recruitment is the search for employee candidates through advertisements and other methods, screening candidates with interviews and tests. It is then selected based on the test results whether they are able to fulfill their new role efficiently.

Definition of Remuneration and Rewards

Based on the total reward theory proposed by WorldatWork (Hong & Junqing, 2020), revealed remuneration and rewards are the most important things and one of the factors that influence the overall employment relationship and enthusiasm of employees and people with different characteristics in the company. It aims to establish a new mode to improve labor relations and stimulate worker enthusiasm through an incentive function called total rewards so that companies can boost labor productivity and profits will increase, then the company will develop along with capital accumulation and absorb more labor. This is a strategy in human capital management that allows cooperation and win-win solutions between employers and employees.

According to Martocchio, remuneration, and rewards are a very important part of employees as a remuneration portfolio (Martocchio, 2011). Currently, regardless of the proportion in any organization remuneration and rewards constitute one of the company's operating budgets Linz and Semykina, (2013) in (Galanaki, 2020). Remuneration is a considerable operating expense for any employer, but the company will also be rewarded employees for contributing to improving their well-being (e.g., fitness center or health services, food, and transportation) and the company also assists employees in dealing with challenges in

their personal lives (e.g., health insurance or career breaks to care for family) and incorporates work with personal obligations (e.g., childcare services, etc.).

Definitions of Training and Development

Training and development are functions in human resource management used to meet the gap between current and expected performance (Elnaga & Imran, 2013). According to Mangkunegara (2013), the term training is intended for executive employees in order to improve technical knowledge and skills, while development is intended for managerial-level employees in order to improve conceptual abilities, and decision-making abilities, and expand human relations. According to Handoko in Hartatik (2014), training is intended to improve the mastery of various skills and techniques for carrying out certain work, detailed and routine. Training prepares employees to do the jobs now. While development has space Broader scope in an effort to improve knowledge, abilities, attitudes, and personality traits.

Definitions of Big Data Predictive Analytics

Big Data Predictive Analytics (BDPA) is a new set of technologies that can store and process very large volumes of data from various types of data in real time and at a lower cost (Bag et al., 2021). BDPA can be said to be data integration and technology that accesses, integrates, and reports all available data by filtering, correlating, and reporting information and insights that cannot be accommodated with past data technologies (Mikalef et al., 2020). According to Marsden and ICF GHK (2013), BDPA is an emerging phenomenon, reflecting a higher dependence on data in terms of volume growth, variety, and speed.

The concept of big data is defined by Goes (2014) as the amount of highly diverse data resulting from observations that support different types of decisions. In the definition of big data, Schroeck (2012) focuses more on a larger scope of information that includes real-time information, non-traditional forms of data media, new technology-based data, data volume, the latest keywords, and social media data. Although volume and variety have caused much attention in defining big data for example (Johnson et al., 2019), other studies explain the role of speed and honesty (Brod, 2012) and business value aspects of big data (Forrester, 2012).

Definitions of Employee Retention

Employee retention is the process by which Employees are encouraged to remain with the organization for a maximum period of time. Employee retention is beneficial for the organization as well as for employees. When they feel dissatisfied, they tend to move to another organization. It is the employer's responsibility to retain its best employees, otherwise, the organization will lose its top talent (Anitha, 2015).

Retention is a voluntary step by an organization to create an environment that engages employees for the long term according to Chaminade, (2007) (Goud, 2013). According to Samuel and Chipunza (2009), the main purpose of retention is to prevent the loss of competent employees to leave the organization as this can adversely affect the productivity and profitability of the organization. The conclusion is that the issue of employee retention in the current era is indeed very important for almost all organizations in the world, because without good planning of employee retention strategies, organizational sustainability becomes uncertain so not only operational activities will be disrupted, but the biggest impact is not achieving the vision and mission and objectives of the planned organization.

Retention factors incorporate the needs and want of employees at any age, increasing levels of individual job satisfaction, loyalty, and commitment Boomer Authority (2009). Cunningham (2002) states that employees place recognition, flexibility, and training as top priorities to extend employee retention. Furthermore, career development Boomer Authority (2009) (Kaur, 2017), organizational commitment at Patrick Owens (2006), communication Gopinath and Becker (2000), and superior-subordinate relationships at Zenger, Ulrich, Smallwood (2000) are also known factors as reasons for employees to stay in the organization. Factors affecting employee retention for organizational continuity according to Yazinski, (2009) in (Salisu et al., 2017) are as follows:

1. Skill Recognition
   Providing skill recognition for personal work achievements is an effective strategy for employee retention at all ages Yazinski, (2009). Studies show recognizing individual work performance will extend employee employment at Redington (2007). The Gale Group (2006) states the benefits of personal skill recognition are priceless, the impact of verbal praise has the ability to increase employee loyalty, motivation, and perseverance. Recognition of skills individuals will motivate positive behavior, ethics, teamwork, confidence, and growth in all employees Redington, (2007). Thus, recognition of skills (ranging from verbal praise to incentives/rewards) and learning opportunities (growth/development) will improve individual performance, effectiveness, and employee retention (Sinha & Sinha, 2012).

2. Learning and Working on Climate
   Learning and development opportunities are currently critical to employee retention Hytter, (2007), and an organization must shape supportive learning and work climates. The concept of learning and working climate comes from previous research (Burkhauser, 2017). It generally refers to an environment where employees can learn and work. More specifically, the concept can be elaborated by referring to work guidance and rewards, job pressure, the amount of empowerment and responsibility employees experience, choices in job and development tasks, the provision of challenging and meaningful work, and progress and development opportunities. The results of previous studies show that the appreciative approach, operationalized through appreciative learning and work climate, has a positive effect on employee retention (Loayza et al., 2009).

3. Job Flexibility
   Job flexibility is essential to retain employees of all ages at Boomer Authority (2009). Researchers explain the importance of work flexibility such as scheduling variations that better accommodate individual work time, workload, responsibilities, and locations around or close to the family Pleffer, (2007). Studies show that flexibility empowers individuals to facilitate a healthier balance between work and personal life for all ages employees at Eyster, et al., (2008) say that employees who have job flexibility options report having higher levels of performance, concentration, satisfaction, productivity, loyalty, and mental capacity at any age (Sinha & Sinha, 2012).

Conceptual Framework

Based on the description that has been described, then can be formed conceptual framework based on the resource-based view (RBV). The resource-based view (RBV) has attracted significant attention from resource management and research (Dubey et al., 2019). RBV argues that firms gain a competitive advantage through the incorporation of resources and strategic capabilities (Kidwell et al., 2018). Logically RBV can understand an organization as a collection of tangible and intangible resources Shoemaker (1993) in (Wahl & Prause, 2013). The theoretical framework includes, as stated in the literature review, recruitment and selection, remuneration and rewards, and training and development, as independent factors leading to employee retention with the mediating effect of big data predictive analytics.
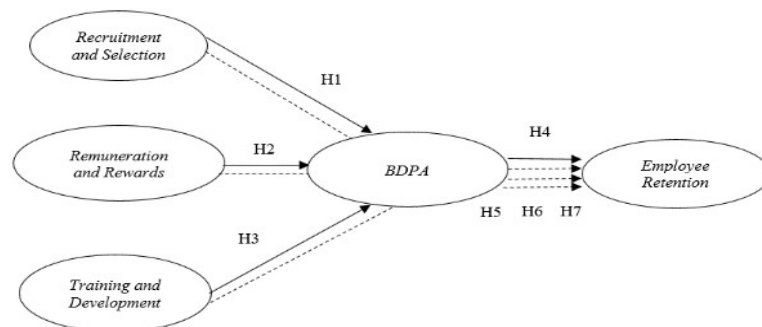
Figure 1
Conceptual Framework

Hypothesis Development

The results of hypothesis development in this study are: Studies have shown that appropriate recruitment practices result in greater employee retention opportunities Griendling, (2008) in (Shanker, 2020). Employees are more likely to stick with a company that delivers on the promises made to them. Companies that provide a realistic view of the corporate environment, progress, opportunities and job expectations for new employees can positively affect employee retention Scott et al., (1999) in (Koopman et al., 2016). Online recruitment or also known as e-recruitment allows companies to empower various internet-based solutions to recruit candidates. For example, by utilizing online job advertisements, both on job search portals, social media, and the company's website. Based on the results of the above research, the following hypotheses can be formulated:

H1: There is an influence of recruitment and selection on big data predictive analytics

Gilliver (2009) argues that an employer's brand identifies an organization in the market and makes it unique. It gives everyone in the organization a handle on what the organization is like, the company's recruitment process, employee expectations such as remuneration and rewards, incentives, and interactions among people in the organization so that everyone interested in joining the organization will get a clear picture of what to expect. Based on the results of the above research, the following hypothesis can be formulated:

H2: There is an effect of remuneration and rewards on big data predictive analytics

In addition, training practices and organizational development will give confidence to employees who feel that learning programs have been designed to polish their skills that it is necessary to work effectively and ultimately help achieve objectives as well organizational goals. (Gupta & George, 2016) have finding employee development practices can increase employee commitment to their responsibilities, which in turn will improve organizational performance (Permatasari, 2014). Furthermore, based on the social exchange theory, Sanner-Stiehr and Vandermause (2017) and Naim and Lenka (2018) explained that employees will expect to have a good employee development program for their advancement of the organization in return for loyalty as well as their performance.

H3: There is an influence of training and development on big data predictive analytics

Big Data Predictive Analytics (BDPA) stimulates corporate interest in embracing data-driven decision-making and sophisticated Big Data applications (Srirama et al., 2022). It has an amazing ability to transform entire business processes that's why research on big data has become so popular among the academic community and policymakers (Akter & Wamba, 2016; Dubey et al., 2019). Based on the results of the above research, the following hypotheses can be formulated:

H4: There is an influence of big data predictive analytics on employee retention

Big data allows HRM researchers to dynamically measure factors to establish clearer causal mechanisms (Zhang et al., 2021). Therefore, detailed data and further implications than pure relational conclusions in HRM research can be obtained by big data analysis (Kirchner & Akdere, 2017). Based on the results of the above research, the following hypotheses can be formulated:

H5: There is an influence of recruitment and selection on employee retention mediated by big data predictive analytics

By adopting a critical perspective, incorporating big data analysis can complement current mainstream approaches, enable HRM researchers to reintroduce the human element to HRM, and empower HRM researchers to understand more comprehensively the day-to-day nature of employees and companies from a broader, more human perspective. In recent HRM research, scholars have recognized the problem of neglect of the human factor (Braun et al., 2018). Current small-data research faces difficulties in capturing nuances (such as interpersonal interactions or day-to-day organizational activities) in the human element (Cheung et al., 2017). This problem, however, can be solved with the help of big data. For example, by systematically analyzing employee data on social media, such as in Facebook posts, HRM researchers can study patterns or changes in the nuances of human elements that were previously considered ambiguous. Therefore, it is important for HRM research to embrace a big data approach. Based on the results of the above research, it can be formulated the hypothesis is as follows:

H6: There is an effect of remuneration and rewards on employee retention mediated by big data predictive analytics

Previous research aimed to help promote the integration of big data approaches with highly inclusive HRM research of both deductive and inductive paradigms. We share Mcabee et al. (2017) belief that "the use of big data analytics offers a better opportunity. Small data were used in sample-based studies that "lacked the characteristics of volume, velocity, and variation" (Yang & Chen, 2018). Despite the recent prevalence of big data analysis, small data analysis still plays a dominant and indispensable role in HRM research (Angrave et al., 2016). Large and small data studies have some\main similarity is that both aim to identify, extract, and refine hidden data. Based on the results of the above research, the following hypotheses can be formulated:

H7: There is an effect of training and development on employee retention mediated by big data predictive analytics

RESEARCH METHOD

The research method used in This research is a quantitative method. According to Azwar (Azwar, 2012), quantitative methods are research that uses statistics/quantification in obtaining data and is processed using statistical analysis. Sempel in this study was an employee of PT Addis Citra with a total of 145 respondents. The data collection technique used in this study was a questionnaire or questionnaire. While the data analysis in this study uses the Structural Equation Model (SEM) with the AMOS 26 program.

RESULTS AND DISCUSSION
Description of Respondents

Data used in this study is primary data, the primary data used are respondents from employees of PT Addis Citra with a sample of 145 respondents. The following are the details of PT Addis Citra's employee respondent data:

Table 1
Characteristics of Respondents based on Gender

No	Gender	Amount	Percentage
1	Male	98	68%
2	Female	47	32%
	Total	**145**	**100%**

Source: Primary data processed

Based on Table 1, there are respondents of PT Addis Citra employees with a percentage of the male gender as many as 98 employees or 68%, and female respondents as many as 47 employees or 32%.

Table 2
Characteristics of respondents based on Education

No	Education	Amount	Percentage
1	High School	10	7%
2	Associate's Degree (D3)	12	8%
3	Bacherol (S1)	114	79%
4	Magister (S2)	9	6%
	Total	**145**	**100%**

Source: Primary data processed

Based on Table 2, there are respondents of PT Addis Citra employees with a percentage of high school education level of 7%, D3 (Associate's Degree) as much as 8%, S1 (Bacherol) as much as 79%, and remaining 6% is S2 (Magister).

Table 3
Characteristics of Respondents based on

No	Position Level	Amount	Percentage
1	Staff	60	41%
2	Senior Staff	41	28%
3	Supervisor	29	20%
4	Manager	15	10%
	Total	**145**	**100%**

Source: Primary data processed

Based on Table 3, there are respondents of PT Addis Citra employees with a percentage of Saff position level as much as 41%, Senior Staff as much as 28%, Supervisor as much as 20% and the remaining 10% is Manager position level.

Table 4
Characteristics of respondents based on Status

No	Status	Amount	Percentage
1	Remaining	48	33%
2	Contract	97	67%
	Total	**145**	**100%**

Source: Primary data processed

Based on Table 4, there are respondents of PT Addis Citra employees with a percentage of permanent employee status of 33%, and the remaining 67% with contract status.

Table 5
Characteristics of respondents based on Period of Service

No	Period of Service	Amount	Percentage
1	<= 1 year	23	16%
2	<= 5 year	98	68%
3	<= 10 year	19	13%
4	>10 year	5	3%
	Total	**145**	**100%**

Source: Primary data processed

Based on Table 5, there are respondents of PT Addis Citra employees with a percentage of <=1 year of service as much as 16%, <=5 years as much as 68%, <=10 years as much as 13%, and the rest as much as 3% with a service life of >10 years.

Table 6
Characteristics of Respondents Based on Total Income

No	Income	Amount	Percentage
1	<= 4,7 Million	25	17%
2	<= 10 Million	92	63%
3	<= 15 Million	10	7%
4	>15 Million	18	12%
	Total	**145**	**100%**

Source: Primary data processed

Based on Table 6, there are respondents of PT Addis Citra employees with a percentage of income level <=4.7 million as much as 17%, <=10 million as much as 63%, <=15 million as much as 7%, and the rest as much as 12% with an income level of >15 million.

SEM (Structural Equation Modeling) Test
 a) Evaluation of Goodness of Fit
    Criteria At this stage, testing is carried out to the suitability of the model through a review of various goodness of fit criteria. Here are some conformity indices and cut-off values:

Table 7
The Goodness of Fit Model Results

Measurement Type	The Goodness of Fit Index	Cut Off	Value	Conclusion
Absolute Fit Measure	p-value	≥ 0,05	0,000	Poor Fit
	GFI	≥ 0,90	0,767	Marginal Fit
	RMSEA	≥ 0,10	0,090	Goodness of Fit
Incremental Fit Measure	NFI	≥ 0,90	0,858	Marginal Fit
	TLI	≥ 0,90	0,907	Goodness of Fit
	CFI	≥ 0,90	0,917	Goodness of Fit
	IFI	≥ 0,90	0,918	Goodness of Fit
	RFI	≥ 0,90	0,839	Marginal Fit
Parsimonious Fit Measure	AGFI	≤ GFI Value	0,715	Goodness of Fit

Source: Primary data processed

From the results of the suitability test of the model above, the value of sig, probability of $0.000 < 0.05$ can be concluded that poor fit. GFI has a value of 0.767 which means marginal fit because it is close to the cutoff value. RMSEA has a value of $0.090 \leq 0.10$ which means goodness of fit.

The next criteria are NFI and RFI which have values of 0.858 and 0.839 which mean marginal fit, while TLI, CFI, and IFI have values of 0.907, 0.917, and 0.918 which mean goodness of fit because they have a cutoff value of ≥ 0.90.

The last criterion is the AGFI value of 0.715 which means goodness of fit because it meets the cutoff value, which is $\leq$ GFI value of 0.767.

Overall, it can be concluded that this model is declared feasible (goodness of fit) so that it can proceed to the next test, namely hypothesis testing. The picture on this model is as follows.
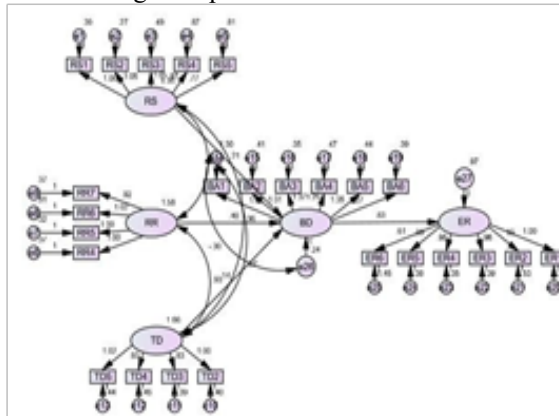
Figure 2
Full Model Test Results- Structural Equation Model (SEM)

b) Test The Hypothesis

The results of SEM analysis as a step of Hypothesis testing are as follows:

Table 8
Test the hypothesis

			Estimate	S.E.	C.R.	P	Label
BDPA	< ---	RS	.206	.055	3.749	***	
BDPA	< ---	RR	.402	.058	6.897	***	
BDPA	< ---	TD	.135	.056	2.422	.015	
ER	< ---	BDPA	.834	.142	5.882	***	

Source: Primary data processed

Hypothesis Testing 1

Relationship estimation parameters between recruitment and selection (RS) for big data predictive analytics (BDPA) were obtained at 0.206. Testing the relationship between the two variables

shows the value C.R = 3.749 with probability = 0.000 (p < 0.05). So, it can be concluded that there is an influence of recruitment and selection on big data predictive analytics. Thus, hypothesis 1 is accepted because there is a positive correlation between recruitment and selection to big data predictive analytics.

Hypothesis Testing 2

Relationship estimation parameters between remuneration and reward (RR) for big data predictive analytics (BDPA) were obtained at 0.402. Testing the relationship between the two variables shows the value of C.R = 6.897 with probability = 0.000 (p < 0.05). So, it can be concluded that there is an influence on Remuneration and reward for big data predictive analytics. Thus, hypothesis 2 is accepted because there is a positive correlation between remuneration and reward for big data predictive analytics.
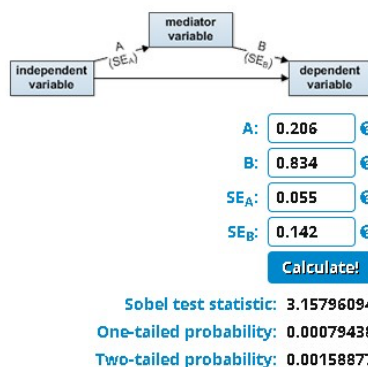
Hypothesis Testing 3

Relationship estimation parameters between training and development (TD) on big data predictive analytics (BDPA) was obtained at 0.135. Testing the relationship between the two variables shows the value of C.R = 2.422 with probability = 0.015 (p < 0.05). So, it can be concluded that there is an influence of training and development on big data predictive analytics. Thus, hypothesis 3 is accepted because there is a positive correlation between training and development to big data predictive analytics.

Hypothesis 4 Testing

Parameters of estimation of relationships between big predictive analytics (BDPA) data against employee retention (ER) is obtained by 0.834. Testing the relationship between the two variables shows the value C.R = 5.882 with probability = 0.000 (p < 0.05). So, it can be concluded that there is an influence of big data predictive analytics on employee retention. Thus, hypothesis 4 is accepted because there is a positive correlation between big data, predictive analytics and employee retention.
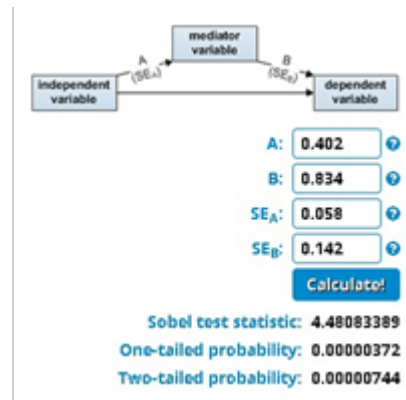
Hypothesis Testing 5

Figure 3
Sobel Test Result

Source: Primary data processed

The results of the fifth hypothesis test show a calculated t value of 3.158 > 1.656 which can be interpreted that predictive analytics big data variables have a mediating role in influencing recruitment and selection of employee retention. This is further strengthened by looking at the GIS value of 0.000 < 0.05, which means that there is a significant influence of recruitment and selection on employee retention mediated by big data predictive analytics.
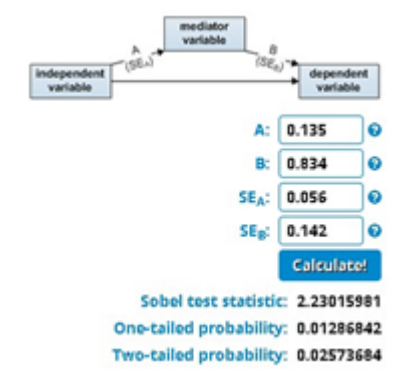
Hypothesis Testing 6

Figure 4
Sobel Test Result

Source: Primary data processed

The results of the sixth hypothesis test show the amount of calculated t value of 4,481 > 1,656 which can be interpreted that big data predictive analytics variables have a mediating role in influencing remuneration and rewards for employee retention. This is further strengthened by looking at the GIS value of 0.000 < 0.05 which means that the effect of remuneration and rewards on employee retention mediated by big data predictive analytics is significant.

Hypothesis Testing 7

Figure 5
Sobel Test Result

Source: Primary data processed

The results of the seventh hypothesis test show a calculated t value of 2,230 > 1,656 which can be interpreted that the predictive analytics big data variable has a mediating role in influencing training and development of employee retention. This is further strengthened by looking at the GIS value of 0.013 < 0.05, which means that there is an influence of training and development on employee retention mediated by significant big data predictive analytics.

CONCLUSION

Based on the results of research that has been done To analyze the effect of recruitment and selection, remuneration and rewards, training and development mediated by big data predictive analytics on the employee retention of PT Addis Citra employees, the following conclusions can be drawn: 1) There is an influence of recruitment and selection against big data predictive analytics. 2) There is an effect of remuneration and rewards against big data predictive analytics. 3) There is an influence of training and development against big data predictive analytics. 4) There is an influence of big data predictive analytics against employee retention. 5) Big data predictive analytics has a mediating role in influencing recruitment and selection of employee retention. 6) Big data predictive analytics has a mediating role in influencing remuneration and rewards for

employee retention. 7) Big data predictive analytics has a mediating role in influencing training and development of employee retention.

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