

# Impact of Artificial Intelligence on Recruitment Process

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**Abstract.** This research is an explanatory study which discusses the impact of artificial intelligence technology, virtual recruitment environment in e-HRM on recruitment process comprehensively from the candidate perspective, the purpose of this study is to examine the effect of the application of artificial intelligence technology and virtual recruitment environment on electronic human resource management on recruitment process. In this study researchers used quantitative methods where the number of samples were 40 workers who had worked at the company for a minimum of 1 year and had used e-HRM for the recruitment process, data was obtained through distributing questionnaires to selected respondents using non-probability methods and snowball sampling. The data processing in this study used the Smart PLS 3.0 program. The result showed that the application of artificial intelligence can help the recruitment process and the development of virtual recruitment environment in e-HRM system can give contribution according to the original purpose of its use.

**Keywords:** artificial intelligence, e-hrm, virtual recruitment environment, human resource, recruitment process

## 1. Introduction

In the era of digitalization and industrial revolution 4.0, one of the main challenges in the world of employment across industry is high turnover rates. Based on data from Bureau Labor of statistic, estimated turnover rate from one industry in the United States reaches more than 50%, in some sectors (eg hotels and food) have experienced turnover rates more than 70% [1]. Turnover rates from this workforce has dramatic impact on labor cost, with an industry survey showing that 41% of companies found that entry-level employees would decided to leave, it cost the company \$30,000 [2]. It takes a lot of time and money to attract applicants. The result from previous research related to the turnover rate in Indonesia, with target of the millennial workers showed that only 25% of millennial workers are feeling involve with the companies, while 9% of millennial workers are felt not tied to the company, and 66% are partially feel bounding with the company. 60% of millennial workers are considering leaving the organization if they don't feel fit with the company [3]. This phenomenon will certainly affects the turnover rates of a company and might impact organization performance[4]. High turnover intentions will increase the frequency of leaving of current job and have negative impact within the company, such as financial and ccommunications between employees [5]. To answer this gap, on how to make the recruitment process produce candidates that match the values of the specific job and organization, this is the role of Artificial Intelligence technology,

electronic human resource management (e-HRM) design by applying virtual recruitment environment. With help of technology, it is expected can help companies to reduce employee turnover rates and ensure that they can recruit, motivate, and retain best employees [6]. the purpose of this study is to know the impact of application of Artificial Intelligence technology, e-HRM, and virtual recruitment environment on recruitment process and to answer research question from this study below:

1. Does the use of AI technology significantly affect the recruitment process?
2. Does the use of AI technology significantly affect on eHRM?
3. Does the use of eHRM significantly affect the recruitment process?
4. Does virtual recruitment environment significantly affect the recruitment process?
5. Does virtual recruitment environment significantly affect on eHRM?
6. Does the use of AI technology in e-HRM significantly affect the recruitment process?
7. Does the application of virtual recruitment environment in e-HRM significantly affect the recruitment process?

## **2. Literature Review**

### **2.1 Artificial Intelligence**

AI can be defined as the use of technology that aims to reproduce human cognitive abilities to achieve goals by considering obstacles that may occur [7]. The Society of Human Resource Management (SHRM) has identified AI as the top of the technological trend and major contributor in human resource management in the future [8]. to have full advantage of AI technology in order to support HR, an organization needs to understand on how technology and statistics can improve the decision-making process [6]. The ability of AI technology can support three functional areas of an organization, first, AI can improve the automation process, second, AI can assist in the decision-making process, and third, AI can be as an intelligent agents and chatbots for supporting tools [9].

### **2.2 Virtual Recruitment Environment**

The definition of Virtual Recruitment Environment is an online environment that allows companies and potential job applicants to interact with each other [10]. a sophisticated designed recruitment web which allows applicant to complete job applications and even conduct an online interview process. The virtual recruitment environment is determined by a combination of aesthetics, informational and process characteristics of a website which specifically intended to provide company and job information.

### **2.3 Electronic Human Resource Management**

The definition of e-HRM refers to connecting individuals and collectives using information technology assistance that prioritize the function of HR division activities. Other definition of e-HRM is a tools which provided by the organizations to support HR strategies using internet technology [11]. from the previous research showed the use of e-HRM technology can improve human resource performance. There are two activities from the e-HRM technology that support recruitment process, first is e-recruitment, second is e-selection. The purpose of using e-recruitment in an organization to attract many qualified applicants, companies can selectively choose in the recruitment process and have the opportunities to recruit the best individual to fill positions in an organizations [6]. The definition of e-recruitment is the use of communication technology such as website and social media that aims to find and attract potential candidates, keeps them attracted to the company during the selection process, and influences the decision

that candidates will take. There are four benefits of using e-recruitment, first, to expand the applicant pool, by using e-recruitment, applicants can access the recruitment website anywhere and anytime, second, it can reach candidates who are currently working at other companies or commonly known as passive candidates, third, by using e-recruitment it can reduce time and cost, where all activities are carried out online, fourth, it can increase the attractiveness of applicants to apply for jobs [6]. The company can design the website according to the needs of the candidates [10]. The second activity of e-HRM which can support the recruitment process is e-selection, there are four benefits from using e-selection, first, simplify the job analysis process, second, using e-selection for facilitating employee screening tests online, third, facilitating the interview process, interviews can be done online using video conference applications like Zoom or Skype, fourth, by using e-selection can help the final decision-making process [10].

## **2.4 Recruitment Process**

The definition of recruitment is an activity of finding, attracting, and ensuring the availability of qualified and appropriate people to meet organizational needs [12]. There are two recruitment sources, first is internal source, through transfer or promotion, second is external source, through advertisement, educational institutions, placement agencies, job fairs, outsourcing and job portals [12]. In using e-recruitment, the main focus is to get a lot of applications, this provides benefits for the organization such as getting competent individuals to fill the job positions of a group of applicants [13]. There are two types of recruitment methods which are used as a reference for the organization, first, traditional method and the second is modern method, basically the activity stages are the same, first stage is looking for candidates, second is conducting screening tests, third, conducting interviews, and the last activity is placement. The difference between these two methods is the media and technology used while performing every stage of recruitment, the traditional method does not use much technology assistance while the modern method is assisted by technology [13].

## **2.5 Research Hypothesis and Conceptual Framework**

Based on a study from Niehueser and Boak [14] introduction of AI technology into a high-volume recruitment process has a significant impact on improvements in efficiency and productivity. According to Johnson et al. [6], automating HR practices provides organizations with additional capabilities which enable them to hire the most talented employee and will motivate them to stay with the organization over time. AI becomes an important system, acting as a supporter and leveraging the effectiveness of the Human Resources area [15]. AI also has potential through its ability in optimizing existing processes and improving automation, information and transformation effects, and also detect, predict and interact with humans [7]. Therefore, the hypothesis is:

H1: The use of AI technology has a significant effect on the recruitment process.

H2: The use of AI technology has a significant effect on e-HRM.

One of the advantages of online recruiting sources is they offer a vast array of interactive and informational design options [10]. The enormous amount of information through audio, video and text inside the corporate website helps organizations build their employer brand [16]. However, according to Alden and Harris [17] resource and cultural limitations have stopped most participants from fully adopting the recruitment web. Know the consumer, it's important to define the target market of desired job applicants and understand their motivation and job product knowledge characteristics [10]. Therefore, the hypothesis is:

H3: Virtual Recruitment Environment has a significant effect on the recruitment process.

H4: Virtual Recruitment Environment has a significant effect on e-HRM.

According to [18] e-selection and e-recruitment process seems to be a growing field because of the widespread of usage technologies like skype, web-based tests, video conferencing and web-based job posting for all kinds of employee. Research has shown that eHRM can improve HR outcomes [6]. The most important factors of e-recruitment is cost saving and attracting the large pool of candidate. And by using e-recruitment it is helping the applicant better than the traditional recruitment [19]. Therefore, the hypothesis is:

H5: e-HRM has a significant effect on the recruitment process.

By using e-recruitment and AI, it can help organizations broaden applicant pool, increase timeliness, reach passive job applicants, increase efficiency in recruiting process, enhance applicants attraction to organizations and also can improve assess fit between candidate with organizations [6]. AI also helping recruiters by automatically sending customized e-mail to candidates, providen them with regular updates of their application status, and also administering any test required for the position [20]. According to (Niehueser and Boak [14] AI had significantly reduced the time taken to process each individual application to the scheduled interview with a hiring manager, from up to two weeks with manually processes to an average of seven minutes. Therefore, the hypothesis is:

H6: The use of AI technology in e-HRM has a significant effect on the recruitment process.

The internet recruitment methods, represent a growing and high-potential opportunity for employers to broaden their recruiting reach and cost [10]. According to Mishra and Kumar [16] by adopting the recruitment practices in organizations it offers several benefit to both employee and employer which help in boosting up the employer branding strategy, it is also reduces cost and time, makes the process more user friendly and generates a huge pool of applicants. Promoting the employer brand is one of the most regular activities for participants and in majority of cases seen as central to the e-recruitment campaign [17]. Therefore, the hypothesis is:

H7: The application of virtual recruitment environment in e-HRM has significant effect on the recruitment process.

From the research hypothesis mentioned above, this conceptual framework is modified from Pangkey et al.[3] and Maurer and Liu [10], due to limited quantitative research with subject AI on recruitment process in Indonesia and overseas country, authors combining the conceptual framework from previous studies and the result can be seen in Figure 1 below.

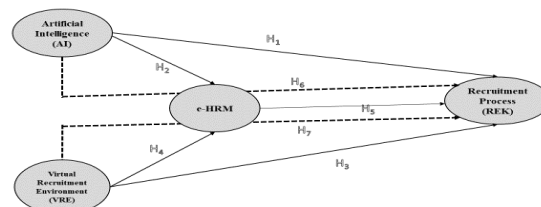


Fig 1. Research Model modified from [3] [10]

Figure 1, described research model of this study, the independent variable is Artificial Intelligence (AI) and Virtual Recruitment Environment (VRE), mediating variable in this model is e-HRM, and dependent variable is recruitment process (REK).

### 3. Methodology and Data Analysis

This research used quantitative research, using 40 sample, respondents from this study are individuals who have used e-HRM, with age range 25-50 years old, male and female with more than one year of work experience and with educational background from high school graduate to master graduate. This research used Smart PLS 3.0 to process data, PLS-SEM can work efficiently with small sample sizes and complex models [21]. The scoring of the answers questionnaire given to the respondents used Likert Scale. The Likert Scale was designed to measure attitude in scientifically acceptable and validated manner since 1932 [22]. The answers of the statement items consisted of strongly disagree which represent by the number of 1, disagree represent by the number of 2, neutral represent by the number of 3, strongly agree is represent by using number 4, and strongly agree represent by using number 5. This research using interval scale.

### 4. Research Result and Discussion

#### 4.1 Outer Model Result

From total data of 40 respondents that have been collected, it shows the highest number of respondents is male 57% compare to female respondents 43%, 57 % of the respondents aged between 25-40 years old, while 43% of respondents aged 41-50 years old, from education level 63% of respondents have bachelor degree, 18% have master degree, and other 30% of respondents have graduate from high school and associate degree. 100% of respondents have used e-HRM. The validity test result can be seen in Table 1.

**Table 1.** Validity Test (Loading Factor and Average Variance Extracted result)

Indikator	Loading Factor	Valid/Not Valid	Average Variance Extracted (AVE)
AI1	0,787	Valid	0,724
AI2	0,910	Valid	
E-HRM 1	0,754	Valid	0,673
E-HRM 2	0,752	Valid	
E-HRM 3	0,902	Valid	
E-HRM 4	0,887	Valid	
E-HRM 5	0,857	Valid	
E-HRM 6	0,754	Valid	
VRE1	0,911	Valid	0,826
VRE2	0,907	Valid	
REK1	0,863	Valid	0,604
REK2	0,707	Valid	
REK3	0,807	Valid	
REK4	0,722	Valid	

Table 1 showed the result of the loading factor is  $>0,70$ , which can be stated all indicators from the variables in this research is valid. For convergent validity results from the Average Variance

Extracted (AVE) has value >0,50 it shows the AVE of this research has meet requirement. The result of discriminant validity from this research can be seen in Table 2.

**Table 2.** Discriminant Validity (Cross Loading result)

	<b>AI</b>	<b>E-HRM</b>	<b>REK</b>	<b>VRE</b>
AI1	<b>0.787</b>	0.036	0.239	0.032
AI2	<b>0.910</b>	0.138	0.328	0.262
E-HRM 1	0.088	<b>0.754</b>	0.485	0.486
E-HRM 2	0.006	<b>0.752</b>	0.548	0.624
E-HRM 3	0.138	<b>0.902</b>	0.543	0.777
E-HRM 4	0.049	<b>0.887</b>	0.429	0.718
E-HRM 5	0.132	<b>0.857</b>	0.525	0.766
E-HRM 6	0.139	<b>0.754</b>	0.576	0.483
REK1	0.222	0.534	<b>0.863</b>	0.587
REK2	0.189	0.530	<b>0.707</b>	0.579
REK3	0.405	0.499	<b>0.807</b>	0.345
REK4	0.243	0.361	<b>0.722</b>	0.359
VRE1	0.187	0.727	0.569	<b>0.911</b>
VRE2	0.172	0.720	0.546	<b>0.907</b>

Table 2 showed, the relationship of each indicators to their variable is greater than other variable. to check other discriminant validity by using the result from the Fornell-Larcker Criterion, the result can be seen in Table 3.

**Table 3.** Discriminant Validity (Fornell -Larcker Criterion result)

<b>Variabel</b>	<b>AI</b>	<b>REK</b>	<b>VRE</b>	<b>E-HRM</b>
AI	<b>0.851</b>			
REK	0.340	<b>0.777</b>		
VRE	0.197	0.613	<b>0.909</b>	
E-HRM	0.113	0.629	0.796	<b>0.820</b>

Table 3 explains the value of each variable is greater than other variable. Which can be stated the conditions of discriminant validity this research have been met. Construct reliability test by using two criteria, composite reliability and Cronbach Alpha. The value of the Cronbach Alpha reliability test for exploratory research purposes must be >0,70 but value >0,60 also acceptable [21], and for the composite reliability value must be >0,70. The test result can be seen in Table 4.

**Table 4.** Composite Reliability & Cronbach Alpha Result

<b>Construct</b>	<b>Cronbach's Alpha</b>	<b>Composite Reliability</b>	<b>Result</b>
AI	0.631	0.839	Reliable
E-HRM	0.902	0.925	Reliable
REK	0.780	0.858	Reliable

VRE_	0.789	0.905	Reliable
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Table 4 showed the value of composite reliability of the four constructs is >0,70 and the result of Cronbach Alpha is >0,60, thus the overall result is reliable.

## 4.2 Inner Model Result

To evaluate structural model in this research by using the R-squares, the result can be seen in Table 5.

**Table 5.** Model Fit Test Result

Indicator	Criteria	Result	Fit/Not Fit
R-square	0,19 (small), 0,33 (moderate), 0,67(large)	REK= 0,489 E-HRM= 0,636	Moderate Large
Tenenhau GoF	$\geq 0,10$ , $\geq 0,25$ , dan $\geq 0,36$ (small, medium, dan large)	0,684	Large
Predictive Relevance	$Q^2 > 0$	0,813	Fit

From Table 5 showed model fit test result based on R-square, GoF and predictive relevance for this research is meet with the criteria large and moderate.

## 4.3 Hypothesis Test

The hypothesis result from this research can be seen in Table 6.

**Table 6.** Hypothesis Result

Hyphothesis	Path Coefficients	P-value	Result
AI – Recruitment Process (H1)	0.091	<0,1	Significant
AI - eHRM (H2)	0.712	<0,1	Not Significant
VRE - Recruitment Process (H3)	0.436	<0,1	Not Significant
VRE - eHRM (H4)	0.000	<0,1	Significant
eHRM - Recruitment Process (H5)	0.129	<0,1	Not Significant
AI - eHRM - Recruitment Process (H6)	0.770	<0,1	Not Significant
VRE - eHRM - Recruitment Process (H7)	0.157	<0,1	Not Significant

Table 6 showed, from seven hypothesis, the result is two hypothesis has significant result and five hypotheses has result not significant.

## 4.4. Discussions

#### **4.4.1 The use of AI technology on Recruitment Process**

H1 The use of AI technology has a significant effect on the recruitment process.

From the hypothesis result shown in Table 6, the relationship between the use of Artificial Intelligence technology to the recruitment process results in a significant with p-value 0.091 at  $\alpha = 0.1$ , thus H1 is accepted. This result is in line with the results of previous research which states that the use of AI technology in the recruitment process helps efficiency and increases rankings in recruitment process activities at L'Oréal's company and the job interview ratio for candidates increases by 82% [23]. The automation of HR practices can provide additional capabilities for organizations that allow them to hire the most talented and motivated people to stay with the organization over time [6].

#### **4.4.2. The use of AI technology on e-HRM**

H2 The use of AI technology has a significant effect on e-HRM.

From the results hypothesis test shown in Table 6 the relationship between the use of Artificial Intelligence technology to e-HRM results with p-value of 0.712 which is not significant at  $\alpha = 0.1$ , thus H2 is rejected. This can be due to challenges in the application of AI technology, the difficulty in process integration AI system with existing, The expensive of AI technology and expertise, internal existing users who do not understand enough the definition and benefit of AI technology [9], to avoid these obstacles, it is highly suggest to organization to conduct benchmarking with other companies that has been successfully implementing AI in e-HRM before implementing this technology internally

#### **4.4.3 The effect of Virtual Recruitment Environment in Recruitment Process**

H3 Virtual Recruitment Environment has a significant effect on the recruitment process.

From the hypothesis result shown in Table 6, the relationship between the application of the virtual recruitment environment to the recruitment process results with p-value of 0.436 which is not significant at  $\alpha = 0.1$  thus H3 is rejected. The analysis that can be given is that making a virtual recruitment environment without paying attention to issues in terms of design can affect the candidate's decision to apply [10]. To avoid this problem, it is advisable to pay attention to details on making a virtual recruitment environment.

#### **4.4.4 The effect of Virtual Recruitment Environment in e-HRM**

H4 Virtual Recruitment Environment has a significant effect on e-HRM.

The result of hypothesis test shown in Table 6, the relationship between the virtual recruitment environment and e-HRM results is significant with p-value of 0.000 at  $\alpha = 0.1$ , thus H4 is accepted. The success of creating a virtual recruitment environment lies in the ability to integrate interactivity, clarity factors and richness of information [10]. The development of e-HRM that refers to the principles of a virtual recruitment environment is expected to have a positive impact on the use of e-HRM.

#### **4.4.5 The Impact e-HRM in Recruitment Process**

H5 e-HRM has a significant effect on the recruitment process.

The hypothesis result shown in table 6, the relationship between e-HRM and the recruitment process resulted with p-value of 0.129 which was not significant at  $\alpha = 0.1$ , thus H5 was rejected. based on previous research 75% of companies in the recruitment process do not provide



feedback to candidates who fail to pass [23]. Additional features to e-HRM that are considered important from the candidate's point of view is expected to provide more positive results on the use of e-HRM in recruitment process, and the mindset of recruiters that must be changed when looking at candidates, that candidates must be considered customers [23], where the main target market of e-HRM, especially e-recruitment and e-selection, are job seekers or candidates [10].

#### **4.4.6 The use of AI Technology and e-HRM in Recruitment Process**

H6 The use of AI technology in e-HRM has a significant effect on the recruitment process.

The hypothesis result shown from Table 6, the relationship between the application of AI in e-HRM to recruitment process resulting with p-value of 0.770 which is not significant at  $0.1 = 0.1$ , thus H6 is rejected. This result is not in line with previous research which states that the application of e-HRM and AI can help organizations to attract, motivate and retain talented employees and reduce turnover rates [6]. Different result may occur because there is still a lack of investment and knowledge related to AI technology in Indonesia, which is contrary to previous research conducted in United State of America, the No. 1 country leading investment in AI technology with total investment from year 2008-2017 reaching a value of \$ 694 billion [24].

#### **4.4.7 The impact of Application of Virtual Recruitment Environment in e-HRM to Recruitment Process**

H7 The application of virtual recruitment environment in e-HRM has significant effect in the recruitment process.

The hypothesis result shown in Table 6, the relationship between the virtual recruitment environment in e-HRM and the recruitment process result with p-value of 0.157 which is not significant at  $\alpha = 0.1$ , thus H7 is rejected. Based on previous research, internet-based recruitment methods represent a high potential and opportunity for employers to expand their recruitment range and reduce recruitment costs at the same time. To achieve this goal, it requires the application of basic principles for designing an effective website [10], but there are challenges in its application such as selecting the right features and selecting the target market [10]. Issues related to the implementation of VRE on e-HRM that has not been resolved may cause the e-HRM function not running as expected.

### **5. Implication and Suggestion for Future Research**

From the results of this study, there are several inputs that can be given, first, before implementing AI technology, it is better to have benchmarking with other companies that have successfully implemented this technology. Second, enriching knowledge about technological developments for HR advancement through e-learning, case study report or webinars with topics related to AI and HR, hopefully this could give a better understanding of benefit and impact from this technology. Third, creating an attractive e-recruitment web design based on know your customer (KYC) principle in order to determine features creation from candidate perspective and HR practitioners. Fourth, giving feedback to candidates who do not pass the recruitment process. And last, adding online interview and assessment features not only during the pandemic, hoped it will also apply to post-pandemic. However, this study has limitation, the small number of respondents, also lack of source of journal with topics related to the impact of AI, e-HRM and Virtual recruitment environment as well as the relationship in the form of quantitative research using candidate perspective. There are two novelty from this research study, first, target respondents from this research are user candidate, because candidates are

main target market from the recruitment industry [10]. Second novelty from this research, additional virtual recruitment environment as variable. For future research that can be developed from this research is user experience candidate on recruitment process.

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