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Optimizing Emerging Digital Technologies For Improved Personnel Recruitment Processes In Financial Institutions: A Narrative Review

Egesiuka Christiana Nneka[1] & Peter, Maryamu[2]

[1,2] Department of Accountancy,
Federal Polytechnic, Ngodo-Isuochi, Abia State, Nigeria
cn.egesiuka@fpi.edu.ng[1] ; Maryamupeter94@gmail.com[2]

ABSTRACT
The rapid advancement of emerging digital technologies has transformed traditional employee recruitment processes, creating opportunities for organisations to improve the speed, efficiency, transparency and cost-effectiveness of talent acquisition. This narrative review examines the optimization of emerging digital technologies for improved personnel recruitment processes, with particular emphasis on their applications and perceived usefulness. The review synthesizes existing literature on the application of Artificial Intelligence (AI), Applicant Tracking Systems (ATS), big data analytics, blockchain technology, machine learning, robotics, cloud computing, cyber-physical systems and cyber-vetting systems across different stages of employee recruitment. The reviewed literature indicates a significant shift from conventional manual recruitment towards technology-mediated recruitment processes involving vacancy advertisement, candidate sourcing, application screening, profile assessment, interviews, background verification and selection. Findings further reveal that Artificial Intelligence is the most widely applied emerging technology in contemporary recruitment, particularly for automated candidate sourcing, curriculum vitae screening, skills assessment, video interviews and predictive analytics. The technologies reviewed offer substantial benefits, including reduced recruitment time and cost, improved efficiency, access to larger applicant pools, enhanced candidate-job matching, reduced human bias and improved data-driven decision-making. Big data analytics facilitates the management and analysis of large volumes of applicant information, while blockchain strengthens the security and verification of candidate records. Cloud-based recruitment technologies enhance scalability and candidate engagement. The review concludes that effective optimization of these technologies requires organisational preparedness, appropriate infrastructure, human resource professionals' digital competencies and careful cost-benefit assessment. A hybrid approach may be appropriate for organisations with limited technological readiness.
Keywords: Artificial Intelligence; Emerging Digital Technologies; Employee Recruitment; Human Resource Management; Personnel Selection

INTRODUCTION

The technological advancement of the fourth industrial revolution (4R) has revolutionized almost all fields including human resource recruitment process. According to Umego and Oti (2023) the emerging and digital technology of the 21st century has transformed the entire recruitment process from manual to automated via sophisticated artificial intelligence system that is programmed for such rigid and complex

process. Similarly, Olanipekun, Oderinde and Ajala, (2023) "recruitment tools built on Artificial Intelligence have continued to create changes in the manner at which recruitment processes are conducted" these changes has both negative and positive implications for human resource professionals and the organisations (Sposato & Ore, 2022). This is because employee recruitment is one of the most complex activities of the human resource professionals that determine to a very high extent the performance of the organization. While recruiting competent and experienced staff will lead to rapid organizational growth and assured sustainability, recruiting incompetent and inexperience staff will lead to the down fall of every organization, as the staff are the major resources within any organization that deploy other resources to achieve organizational goals (Aspan, 2020).

Emerging technologies such as artificial intelligence (AI), machine learning (ML), and digital platforms has been increasing used by Human Resource and organizations in employee selection. These new technologies have great potentials that will facilitate effective employee recruitment process if properly applied. According to Bnumika (2021) emerging technology such as artificial intelligence (AI) can improve the entire recruitment process by ensuring that human bias and errors involved in employee recruitment are eliminated, which will lead to efficient, cost effective and transparent employee recruitment process.

There are few existing studies on the use of emerging technologies, including artificial intelligence (AI) for employee recruitment (Okeyika, et al., 2023; Olanipekun, Oderinde &Ajala, 2023; Hewage, 2023; Umachandran, 2021) among others, however, these studies devoted their attention to the application of emerging technologies for recruitment process, however, there is little attention on the use of artificial intelligence (AI) for recruitment process. Understanding the various technologies that could facilitate effective employee recruitment will increase it usage in many organization (Okeyika, et al., 2023). According to Abdul (2020) people tend to adopt new technology if such technology has many benefits in enhancing their job when compared to their current practices.

This narrative review will discuss the concept of employee recruitment processes, how Artificial intelligence (AI) are applied in the employee recruitment processes, and the perceived usefulness of applying Artificial Intelligence (AI) for employee recruitment process.

Employee Recruitment Processes

Employees of any organization are the most important and indispensable assets of any orgnisation and determines the extent of growth and sustainability of the organization, hence, any activities aimed at recruiting the most qualified candidate is significant to the organization. Employee recruitment is one of the key human resource management functions (Rajyalaxmi, 2023; Alzoubi, 2020; Gill, 2021; Kepha, et al., 2014; Kamran, et al., 2015; Absar, 2012). Some major recruitment processes are vacancy advertisement using different electronic and print media, screening of applicants' resume and CV, sending email and even reminders to applicants, and invitation for interview, interviewing applicants, conducting background check of successful applicants (Leong, 2018).

According to Mandal and Shrivastava (2023) employment recruitment involve the systematic activities of sourcing for and identifying of eligible candidates, screening of the identified candidates, reviewing the credentials and profiles of the applicants and shortlisting for interview and finally selecting the most qualified and experienced candidate to fill the required open jobs. These processes are geared towards ensuring that the candidates selected for the position can contribute productively to the growth of the organization (Kepha, et al., 2014; Kamran, et al., 2015; Absar, 2012). With the advancement of technology these processes are now conducted online via the internet. Recruitment process carried out over the internet is called e-recruitment.

Optimization of Artificial Intelligence (AI) for employee recruitment process

21st century technological advancement has introduced lots of emerging technologies which are applied for fast and efficient employee recruitment process. Researchers are in agreement that human resource professionals are adopting emerging technologies for employee recruitment process. For example, researcher like Meijerink et al. (2021) reported that human resource organisations are taking advantage of

artificial intelligence to improve the entire staff selection and recruitment process. Similarly, Liu et al. (2022) also found out that, many human resource firms are leveraging on artificial intelligence for employee recruitment process.

Other researchers like Horodyski (2023) reaffirmed that; artificial intelligence (AI) is the most used emerging technology for employee recruitment process. Similarly, Mori, et al. (2024) found out that, artificial intelligence is the most used emerging technologies for employee recruitment. It is evidence from available literature. This is because majority of the existing researches confirmed that, human resource organization studied are currently using artificial intelligence. Recent studies are also in agreement with earlier research by Rykun (2019) who found out that the most used emerging technology for employee recruitment is artificial intelligence (AI). Its popularities might be due to ease of use and perceived tendency to react like human

In agreement with other existing researches, the study of Burrell and Mcandrew (2023) reported that, majority of companies studied use artificial intelligence for their staff recruitment processes. Similarly, Wilfred (2018) found out that, artificial intelligence is the most prevalent emerging technology used for employee recruitment process. This similarities among studies further justifies the growing nature of emerging technologies in recent years and how human resource professionals are taking advantages of its potentials to revolutionize the entire employee recruitment process.

Researchers like Deshpande et al. (2020) and Hunkenschroer and Luetge (2022) also aligned with other studies to confirm that, majority of organisations studied use artificial intelligence (AI) for the recruitment of their staff. Ore and Sposato (2021) revealed that, many organisations are using artificial intelligence for their recruitment process. Artificial intelligence (AI) has permitted the automated of the keys employee recruitment functions, consequently, many organisations are deploying artificial intelligence (AI) for all the recruitment processes, however, the deployment of this emerging technology is slow at the moment due to internal and external organizational factors (Sposato, 2021). Additionally, Eubanks (2018) revealed that, other emerging technologies deployed for employee recruitment process apart from artificial intelligence are natural language processing system, deep learning system, machine learning system and neural networks system.

Review of existing literature revealed that the last five years (2020-2024) witnessed the geometric use of artificial intelligence (AI), applicant tracking system, big data analytics, blockchain technology, machine learning, robotics, cloud computing services, cyber-physical system, and cyber-vetting system for automation of employee recruitment processes (Delecraz, et al., 2022; Horodyski, 2023; Kshetri, 2021; Katwa & Mishra, 2020; Kenneally, 2021; Kumari & Dutta, 2024; Allal-Cherif, Aranega & Sanchez, 2021; Ali, et al., 2023; Raja, et al., 2023; Musafiri & Berisso, 2022). It is worthy of mention from the findings that artificial intelligence (AI) is the most applied emerging technology for employee recruitment process currently across the globe as all the studies carried out in the last five years reported the use of artificial intelligence system for employee recruitment processes ranging from applicant tracking, resume/CV screening, online test, applicant profile check among others.

Only few studies found out that, cloud computing services are applied for employee recruitment (Ali, et al. 2023; Mulla, Saha & Prabhakar, 2023). Another emerging technology currently applied for employee recruitment is big data analytics (Oksanen, 2018; Albert, 2019; Mulla, Saha & Prabhakar, 2023; Ali, et al., 2023; Manroop, Malik & Milner, 2024; Vrontis, et al., 2021; Singh & Sahoo, 2023). The findings also showed that organisations and companies are now applying blockchain technology for employee recruitment (Abdul, Wang & Li, 2020; Onik, Miraz & Kim, 2018; Rhemananda, Simbolon & Fachrunisa, 2021; Musafiri & Berisso, 2022). Thus, recent studies reported the use of advance emerging technologies in the difference phase of the employee process. However, it is worthy of mention that artificial intelligence (AI) is currently the most applied emerging technology for employee recruitment process by Human Resource (HR) professionals

Perceived usefulness of Artificial Intelligence (AI) for employee recruitment process

Existing researches are in agreement regarding the usefulness of Artificial Intelligence (AI) for employee recruitment process. The deployment of emerging technologies such as artificial intelligence (AI) in the recruitment processes is expected to improve the entire process by making the exercise fast, effective, efficient and less energy demanding. Recent study by Horodyski (2023) opined that, artificial intelligence (AI) makes employee recruitment process fast, less time consuming and free of stress. In agreement with the above finding, Frail and Laszlo, (2021) reaffirmed that the use of artificial intelligence (AI) improves the efficiency of the entire employee recruitment process.

Additionally, the authors, reported that, using artificial intelligence for employee recruitment minimize the complex, time and energy demanding aspect of employee recruitment which will enable the recruiters to focus on other productive activities within the organization. Similarly, Black and van Esch (2020) reported that, using artificial intelligence (AI) for employee recruitment process improves the efficiency of the recruitment process. Bafna et al. (2019) reported that, deploying artificial intelligence for employee recruitment process improves efficiency of the function by saving time, energy and cost which can e used for other functions.

Some scholars believes that the use of artificial intelligence for employee recruitment process saves time, cost of recruitment and energy of both the human resource professionals and the applicants (Upadhyay & Khandelwal, 2018; Albassam, 2023; Chang, 2024). These three advantages will lead to the popularity of artificial intelligence-mediated employee recruitment process. Similarly, Tambe *et al.* (2019); Rykun, 2019) and Kshetri (2021) in their separate study argued that reduced time, energy and cost of recruiting employees are the major benefits of using artificial intelligence for employee recruitment. Another report from Vedapradha et al. (2019) revealed that, artificial intelligence have transformed the entire employee recruitment process and made it more effective through the reduction of time used for reviewing applicants' CV, resume, candidate's eligibility, applicant's profile review, etc. which usually involves lots of time.

Similarly, Rykun (2019) the use of artificial intelligence has minimize time, energy and cost associated with key recruitment activities such as sourcing for applicants, advertisement of vacancies, reviewing applicants' Curriculum Vitae (CV), applicants' experience and types of training each applicant needs to function effectively and productively in the organisation when employed. Kshetri (2021) reported that, using artificial intelligence (AI) for staff recruitment process will improve the efficiency of the recruitment process through providing access to large pool of information required for efficient and fair recruitment process. Similarly, Abdul (2020) reported that, the deployment of artificial intelligence (AI) for employee recruitment process has significantly improved recruitment process, most especially in the early stages of recruitment such as applicants sourcing, candidate's screening, background check among others.

Artificial intelligence has the potentials to screen the resume, and CV of large numbers of applicants within a short period of time, conduct sourcing of suitable candidate (Hunkenschroer & Luetge, 2022; Melliani, et al., 2024; Laurim, et al., 2021). Additionally, Burrell and Mcandrew (2023) the efficacy of intelligence artificial (AI) for improving the activities involved in employee recruitment is undoubtable. This is because it saves time, energy and finance. In another study, Taylor (2018) found out that the use of artificial intelligence for recruitment eliminate the tedious manual process of staff recruitment that most often cause workplace stress for the recruiters. Similarly, Leong (2018) reported that, with artificial intelligence organization could attract large number of candidates and conclude the processes seemingly, while allowing the human resource professionals to recruit the most qualified out of the pool of applicants.

Artificial intelligence (AI) enhanced employee recruitment have lots of benefits which have led to increase in its application over the last decades among organisations and companies. The major benefits of technology enhanced employee recruitment are cost effective as it saves time, finance and energy (Leong, 2018; Taylor, 2018; Abdul, 2020; Hunkenschroer & Luetge, 2022; Melliani, et al., 2024; Laurim, et al., 2021 Horodyski (2023; Rykun, 2019). When Artificial intelligence (AI) are properly used for

employee recruitment process it will help enhance the whole process while minimizing the chances of human deliberate error and sentiments.

It was also found out that, the application of emerging technologies for employee recruitment process helps to eliminate deliberate human bias and favoritism, improved efficiency, and less stress, reduced complexity of recruitment process, reduced cost of professionals hiring professional many human resource, reduced time of screening applicants' resume/CV and other document, helps to attract large pool of applicants, facilitate access to large pool of verifiable information about of the applicants, improved matchmaking, effective information sharing, improve organizational image among the applicants, ease of use and drastically reduce the employee recruitment process duration (Sharaburyak, et al., 2020; Wowor, et al., 2022; Burrell & Meandrew, 2023; Parry & Battista, 2022; Mori, et al., 2024; Bhaldar, 2023; Stuss & Fularski, 2024; Sayyad & Srinwas, 2024; Laurim, et al., 2021; Mariami & Lozada, 2023).

Big data analytics helps companies and organisations to easily organise and analyse the large pool of information about eligible applicants sourced from different databases, which will help organization and human resource professional to spend less time in determining the most qualified and experienced candidate for the job (Albert, 2019; Mulla, Saha & Prabhakar, 2023; Ali, et al., 2023; Manroop, Malik & Milner, 2024; Vrontis, et al., 2021; Singh & Sahoo, 2023). It is easier to carry out analysis on large pool of data collected using Big data analytics which will help to reduce the duration of the employee recruitment process while increasing efficiency.

Using blockchain technology to save all the information concerning the applicants collected during the recruitment process will reduce the incident of cybercriminals hacking into the company's record to source for biodata of applicants which can be used to impersonate them or defraud them (Abdul, Wang & Li, 2020; Onik, Miraz & Kim, 2018; Rhemananda, Simbolon & Fachrunisa, 2021; Musafiri & Berisso, 2022). This is because data stored using blockchain technology are more secured and less prone to security threat. Among others blockchain technology makes it difficult for cybercriminals to hack the database of organisations where the information of the candidates were stored for further analysis.

CONCLUSION

There is a recent paradigm shifts from traditional manual employee selection process to emerging technology-mediated employee selection process. Recently, advancement in technologies have led to the use of emerging technologies such as artificial intelligence (AI), applicant tracking system, big data analytics, blockchain technology, machine learning, robotics, cloud computing services, cyber-physical system, and cyber-vetting system for employee recruitment process. These emerging technologies are applied in different stages of the employee recruitment processes. The research also concluded that Artificial intelligence (AI) is the most applied emerging technologies for employee recruitment process by human resource professionals who applies the technology for different stages of employee recruitment processes such as job description analysis, candidate sourcing, resume screening, video interview, skills assessment, predictive analytics, and employee onboarding etc. Cloud computing services are applied for employee recruitment process such as cloud-based applicant tracking system (ATS), virtual interview platforms, cloud-based recruitment marketing, and cloud-based background checks.

Human resource professionals also currently apply applicant tracking system for automated resume screening, candidate sourcing and management, streamlined interview process, data analysis and reporting, and compliance and recording-keeping. Big data analytics is another emerging technology applied for predictive modelling for candidate, sourcing optimization and candidate sourcing, diversity and inclusion analysis, personalized recruitment marketing, and employee retention and turnover prediction. Most recently, Blockchain technology are applied for verification of candidate credentials, transparent and secure candidate data management, automated background checks, and smart contracts for recruitment. This implies that emerging technologies are currently applied for all the employee recruitment processes ranging from planning and approval stage, through sourcing and advertising to application collection and screening, interview and assessments, reference checks and verification.

Applying Artificial Intelligence (AI) for employee recruitment process by human resource professionals helps to eliminate deliberate human bias and favoritism, improved efficiency, and less stress, reduce complexity of recruitment process, reduce cost of professionals hiring professionals, and also reduced time of screening applicants' resume/CV and other document. The use of Applicant Tracking System for employee recruitment process helps to attract large pool of applicants, improved matchmaking, effective information sharing, and facilitate access to large pool of verifiable information about of the applicants. The application of Big Data Analytics for employee recruitment helps companies and organisations to easily organise and analyse the large pool of information about eligible applicants sourced from different databases, ad help organization and human resource professional to spend less time in determining the most qualified and experienced candidate for the job. Blockchain Technology is another emerging technology that helps human resource professionals to save all the information concerning the applicants collected during the recruitment process, and helps to reduce the incident of cybercriminals hacking into the company's record to source for biodata of applicants. Similarly, the usage of various Cloud Computing Services for employee recruitment process will improve recruitment efficiency and scalability, enhance candidate experience and engagement, reduce recruitment costs and time-to-hire, and increased data driven decision making and analytics.

RECOMMENDATIONS

The following recommendations were suggested based on the findings of the review:

1. Human resource professionals should conduct cost and benefit analysis before applying any emerging technology for their employee recruitment process. This will help the human resource professionals to offer professional advice to their organization on the most suitable and appropriate emerging technologies to apply considering their needs and level of preparedness
2. There is urgent need for organisations to retrain their human resource professional regularly so as to ensure that they are equip with the skills required to effectively and properly apply emerging technologies for employee recruitment process. This can be done through regular sponsorship of the human resource professionals to national and international conference, seminars or workshops on the use of emerging technologies for employee recruitment process.
3. Organisations who are not adequately prepared via human and technological infrastructure to use emerging technologies for employee recruitment process could adopt hybrid technique; where some stages of the employee recruitment are done using emerging technologies while others are done using the traditional methods of face to face. This is because the major goal of employee recruitment is to ensure that the most qualified, experience and innovative candidates are selected to facilitate rapid growth and development for the organization.

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