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Recent Updates on Intelligent System for Talent Management: Does That Become a Helpful System?

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ABSTRACT
The use of information technology in human management today has increased, along with the implementation of intelligent systems that generally use artificial intelligence (AI) in their application. One of the areas of human management that has adopted AI is talent management (TM). TM is crucial for companies to identify, manage, determine, assess, and recommend talent (in this case, it can be employees) for their company's sustainability. The application of family planning in TM is not as extensive as thought, but this study tries to review the latest research that adapts AI to a very complex TM process. The results of this review are at least 11 articles involved in the use of family planning. These 11 articles certainly discuss one or more processes in TM, such as talent identification, talent matching or mapping, and talent recommendations. Some critical studies in the future are that in practice, AI needs to be widely used, especially to handle large-scale data management (data intelligence), in addition to intelligent system methods, and AI can be used for all processes in TM, proven to be accurate, efficient, safe, and fast in practice.

Keywords: *Artificial Intelligence, Business Intelligence, Data Intelligence, Human Resources Management.*

ABSTRAK
Penggunaan teknologi informasi dalam bidang manajemen manusia dewasa ini telah meningkat, seiring dengan implementasi sistem cerdas yang umumnya menggunakan kecerdasan buatan dalam penerapannya. Salah satu bidang manajemen manusia yang telah mengadaptasi kecerdasan buatan (KB) ialah manajemen talenta (MT). MT merupakan faktor krusial bagi perusahaan untuk mengidentifikasi, mengelola, menentukan, menilai, dan merekomendasi talenta (dalam hal ini dapat berupa karyawan) untuk keberlanjutan perusahaannya. Penerapan KB dalam MT tidak seluas yang dikira, namun studi ini mencoba mengulas riset-riset terkini yang mengadaptasi KB dalam proses MT yang sangat kompleks. Hasil ulasan ini setidaknya terdapat 11 artikel yang terlibat dalam penggunaan KB. Ke-11 artikel ini tentunya membahas salah satu atau beberapa proses dalam MT, seperti identifikasi talenta, pencocokan atau pemetaan talenta, dan rekomendasi talenta. Beberapa hal yang menjadi kajian penting di masa mendatang ialah dalam prakteknya, KB perlu secara luas digunakan khususnya untuk menangani manajemen data berskala besar (kecerdasan data), selain itu dengan metode-metode sistem cerdas dan AI dapat digunakan untuk semua proses dalam MT, terbukti secara akurasi, efisiensi, aman, dan cepat dalam prakteknya.

Kata Kunci: Kecerdasan Buatan, Kecerdasan Bisnis, Kecerdasan Data, Manajemen Sumber Daya Manusia.

1. Introduction

The role of information technology (IT) today has helped many things in human work [1]. One of them is artificial intelligence (AI) which can help computer systems analyze human problems based on their knowledge base [2]–[4]. Artificial intelligence (AI) as an intelligent system can replace conventional human work, where with AI, human work is much more efficient and fast and according to the standards set in their work, including applicable in terms of human management [5], [6]. Besides, AI is a data science system-based that can produce many types of data intelligence. One of the crucial things in management or business intelligence, including data intelligence, was the main topic for the successful organization that aims to achieve the business or goals.

Furthermore, in today's 21st century, several surveys in Indonesia and overseas show increasing awareness of

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company management in managing human resources (HR) [7], [8]. Besides, company performance is not only determined by financial capital, machinery, technology, and fixed capital, namely Human Resources (HR). Organizational success is determined by a line of highly talented human resources [9]–[12]. Companies must manage humans as human capital to provide added value and become a competitive advantage for companies in business competition in the VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) era, a period in which changes occur quickly, even those changes can cause chaos in a system if the person in charge does not innovate more creatively [13]–[15]. Furthermore, TM can also be used to assess organizational productivity [16].

Meanwhile, talent management (TM) is an organizational scheme that systematically functions as a guide, direction, and guidance in obtaining, developing and retaining employees who have talent or talents to achieve organizational goals [5], [17], [18]. Additionally, artificial intelligence (AI) exists to identify and model human thought processes and design machines to mimic human behavior. Smart means having knowledge plus experience, reasoning (how to make decisions and act), and good morals. In addition, the formulation of the problem in this study is that the implementation of an intelligent system in talent management for companies does not yet have a system that makes it easy to determine employee development programs and talent mapping to know the performance and competencies possessed to determine career development strategies and increase capabilities quickly and precisely in this era. So, VUCA based on AI is needed to review.

2. Review Method

The research method used is a short or mini-review that refers to Al Hakim et al. [19] with modifications adjusted to this study. The mini-review stage consists of literature study, identification, abstract screening, manuscript selection, and review result. Publish or Perish (PoP) software version 8 was used in literature searches that fit the purpose of this mini-review study. Inclusion criteria include journal publication articles, conference or seminar proceedings, review articles, short communication studies, books and book chapters, technical notes, editor's comments, or editor's notes. Exclusion criteria include articles or reports or unpublished scientific papers, a thesis or dissertation, languages other than Indonesian and English, patents, IPRs, biographical articles, and case report studies.

2.1. Literature Study

A literature search conducted in the scientific database (Scopus, Clarivate, IEEE, ScienceDirect, Dimensions, Lens, DOAJ, Crossref, Neliti, Moraref, and Garuda) obtained search results for 54 articles with keyword search rules for a combination of logic "*artificial intelligence OR intelligent system OR artificial intelligence + human resource management OR human resource management OR HRD OR personnel management*". A literature search conducted in all databases must be an open-access option. This phase is used for the next phase in the form of identification.

2.2. Identification

Based on the previous phase, which conducted some relevant scientific articles for the first time, the study must identify the title of each article. Title identification must be matched with inclusion criteria with no exceptions. After all selected articles are prepared to complete the next phase, the study must conduct an abstract screening phase.

2.3. Abstract Screening

All selected articles that pass previously must be screening the abstract's article. Each article is read in the abstract and then objectively assessed by researchers for inclusion criteria and this study's aims. The selected articles must be suitable for review purposes, as well as for study goals.

2.4. Manuscript Selection

In the manuscript selection phase, each selected article from the previous phase must be read in depth objective for the full text (full complete read). The novelty, research aims, method, result, discussion, conclusion, and future recommendations are collected. For non-English articles, it is possible to get native-speaker translations. The final papers that are ready to review are about 11 articles.

2.5. Review Result

After all the phases are completed, the final procedure is to write the review result. This phase will be noticed in the next section. If the article also has supplementary files, researchers would be explained as additional information for those papers.

3. Result and Discussions

3.1. Review Result

Table 1 shows the result of the review process in this study. For non-English articles are translated into the English language for easy read in this study.

Table 1. The collected papers of TM with several intelligent systems.

No.	Author(s)	Method/Product	Novelties
1	Siregar & Kartika [20]	Analytical Hierarchy Process (AHP)	Identify how talent is managed and formulate objectives and strategies for future TM using the business intelligence tool: AHP.

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2	Santoso et al. [21]	Analytical Hierarchy Process (AHP)	Provide current competence positions and future needs in Indonesia's banking and financial technology industries, where there was a lot of competence separation. It also identified three priority areas of expertise in Industry 4.0: relation and networking, adapting and responding to change, entrepreneurship, and business thinking.
3	Hamid et al. [5]	Certainty Factor (CF)	Using an expert system's certainty factor (CF) to calculate the potential of employee's TM with confidence level (%).
4	Suhanda et al. [22]	Fuzzy	Design an employee performance appraisal application with a fuzzy method to get a bonus. The designed system provides convenience in processing data, preparing reports, and sending performance appraisal information so that it is cost and time efficient. heading
5	Karatop et al. [23]	Fuzzy	Build a model for investigating the competency level of employees and utilizing this information to obtain an optimal level from employees' emotional and intellectual capabilities and experiences of the employees. The use of fuzzy can deal with uncertainty and vagueness in the assessment of TM.
6	Sjachriatin [24]	Structural Equation Modeling (SEM)	TM performance management systems can moderate the relationship between TM and organizational performance. Then the TM performance management systems can be used to identify talented employees, integrate restructuring strategies, and strengthen employee-management relationships to improve their organization's performance.
7	King & Vaiman [25]	Macro-Contingent Approach (Extra- & Intra-Organisational as nested system)	Using a macrocontingent approach can be effective if implemented in TM. Through this embedded system, TM would be a good framework for effective TM practice in the organization.
8	Louzada et al. [26]	Web-Oriented Expert System	A web-oriented expert system can analyze real-time sports data via R software. The system is a powerful tool for identifying talents in soccer.
9	Allal-Chérif et al. [27]	E-recruitment	E-recruitment is an emerging and polymorphous phenomenon that starts with identifying candidates on social networks, continues through gamification of recruitment and job interviews with chatbots, and ends by matching a candidate and a job using AI.
10	Papić et al. [28]	Fuzzy	The Sports Talent Expert System was built. Compared to human sports carrier experts, the system is reliable and accurate for scouting and evaluating young talent.
11	Stephanie & Sarno [29]	C4.5, KNN, and SVM (machine learning or ML)	

According to Table 1, only Sjachriatin [24] and Suhanda et al. [22] use Indonesian for the papers. Besides, most papers that researchers found that there are too many times to use traditional (non-intelligent system) methods, including simulation [30], research and development (R&D) [31], manual Human Asset Value (HAV) Matrix [32], statistical analysis

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(traditional quantitative descriptive approach) [33], [34], non-AI decision making (traditional decision-making system) [35], qualitative approach [36]–[40], explorative study [41], [42], and literature review papers [11], [43], [44]. These papers are disqualified from our review process at the phase of manuscript selection due to this study's focus on the methods that use at least one of the intelligent system methods.

3.2. Discussion of AI Used as Talent Identification

According to Siregar & Kartika [20], the most influential factors in TM are employee development, the most dominant actors in TM are managers, the most important goals are hiring and selecting employees from internal sources, and the most important alternative strategy for TM is to redesign management as an instructor. These factors are identified as multifactorial processes. Louzada et al. [26] say that the right identification in the TM role, optimally with predictive success criteria, is based primarily on intuition rather than other objective criteria. Besides, it is known that talent development and identification is a multifactorial process involving many characteristics. So, to get the best and optimal identification of talent must be able to be considering the predictive success criteria and multifactorial process in managerial roles.

The predictive success criteria mean using prediction analysis (commonly using statistical approaches) to forecast the candidates (talents) based on the average performance from some studied population. For example, based on research by Louzada et al. [26] developed iSports, a web-oriented expert system for the identification of talent in soccer, using the average performance of who stands out from the studied population of soccer players to identify talented candidates based on the statistical approach.

Meanwhile, multidisciplinary factors have affected the result of talent identification [45], [46]. For example, studies by Xiang et al. [47] for sports talent identification needed to consider these factors, such as personal physical quality performance, psychological quality, coach's knowledge, and the identification policies of schools for sports talents. These factors are essential because they are the main factors affecting the identification requirements of sports talent. Furthermore, various motor skills tests, morphologic characteristics measurements, and functional tests are also the factors required for sports talent identification [28].

Furthermore, talent identification is commonly cited as talent development (TD). Moreover, TD is an essential value in the TM process [48], [49]. The TD process today is connected to the digital era and the identification of candidates (talents) on social networks [27]. Between nondigital and digital acquisition, both are important for TD. In summary, talent identification is evidence-based and positively affects organizational resilience operationalized in three dimensions, agility, integrity, and strength. Talent development (TD) and talent succession planning only have a positive impact on the agility of the company, while talent retention has not influenced the three dimensions of organizational resilience [50], [51].

Due to the three dimensions, agility, integrity, and strength, and the need for a multifactorial process in talent identification, it can be helpful to be efficient, fast, accurate, and secure for large-scale data management. Using AI or an intelligent system, the problem of large-scale data management can be solved by data intelligence, so the need to use the intelligent system for talent identification is required as an innovative tool, as well as provide good reliability criteria for the talent.

3.3. Discussion of AI Used as Talent Matching and Recommendation

Talent matching or talent mapping, or talent pool, is the TM process that needs human resources skill requirements for good talent matching. Generally, the process must go on after the talent has been identified. This process is required a mapping process. For example, in banking and financial technology (Fintech), three priority competencies for dealing with Industry 4.0 today are relating and networking, adapting and responding to change and entrepreneurship, and commercial thinking. Besides, companies need talented employees to achieve superior and competitive organizational performance; however, identifying strategic competencies has changed following the development of Industry 4.0, which encourages digitalization in all aspects of business processes [21]. Therefore, it is necessary to consider the talent mapping process of companies, and today's organizational structure is becoming increasingly complex and often changing rapidly, requiring companies to adapt to existing conditions [37].

Studied by Hamid et al. [5] reported that mapping good talent (employee, for example) is required some criteria, such as bad potential, standard potential, and high potential. With three criteria, each criterion must be filled in three to five selections for the talent. If the talent meets the high potential criteria, it should be proposed for promotion. This study also adopted the talent recommendation using the certainty factor method of an expert system.

Suhanda et al. [22] designed an employee performance assessment system using a fuzzy method to receive a bonus. The system design facilitates data processing, reports, and sending performance evaluation information, making it cost-effective and time practical. The system can be helpful in intelligent decision making for talent assessment and mapping the

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next bonus or promotion criteria for talents or employees.

Practical evaluation of the talent's performance should be mapped by evaluating the scores for talent classification. Studied by Stephanie & Sarno [29] using several machine learning (ML) approaches to classify talent performance and mapping. The study shows that classification using Support Vector Machine (SVM) method has the highest accuracy, which is 94.62% (P-value < 0.05). Meanwhile, K-Nearest Neighbors (KNN) is the lowest accuracy method at 87.37%.

The level of employees (talents) and the use of this information is essential to provide a good image for the talent matching process. Besides, the competency level is in the uncertainty conditions. The intelligent system called fuzzy is implemented to solve this problem, so the talent matching process is calculated with certainty value [23]. In summary, talent matching is picturing talent in some organizations or businesses [43].

3.4. AI's Future Works for Talent Management

AI can help all parts of talent management (TM). Several papers have successfully proven better performance and optimized instead of traditional or manual approaches. AI or any intelligent systems are the evidence from the digitalization era. Besides, if TM is adopted using the intelligent system, it should be a global-recruitment process [27]. The AI approach can be used for data intelligence management in the context of globalization and the era of the industrial revolution.

Future work for TM using AI or intelligent systems is needed to improve large-scale data management. In response to modern business, data intelligence is essential for a successful business, so intelligent systems should be the priority for developing business. Furthermore, in line with Liu et al. [6], human resources (HR) is changing to intelligent talent management with the help of AI, big data, and Internet technology. In addition, TM and operation for the organization from five aspects of intelligent and accurate selection, intelligent training and development, intelligent retention, intelligent utilization, and intelligent talent matching, to help the organization improve the level of TM and drive the development of the organization.

4. Conclusion

Talent management (TM) is now challenging intelligent TM and using intelligent systems (including AI) for all parts of the TM process. Today's businesses or organizations meet large-scale data management requirements, so data intelligence is required to manage this issue. Future work for TM must be a massive growth with implementation of AI approach instead using manual-traditional methods.

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