The Effect of Artificial Intelligence (AI) on Human Capital Management in Indonesia

Btari Mariska Purwaamijaya[*], Yogi Prasetyo
Program Studi Bisnis Digital, Universitas Pendidikan Indonesia,
Jl. Dr. Setiabudhi No. 229, Bandung, Indonesia
*btarimariska@upi.edu

Abstract

Human resources in an organization is the capital for the organization and its performance is the main indicator for the organization to achieve its goals. In the current digital era, the shift in human resources is demonstrated by the application of Artificial Intelligence (AI) to organizations in Indonesia, both in companies and in several government organizations. A company has a responsibility to its stakeholders to do the job and get the desired profit. However, no research specifically discusses the analysis of the influence of AI (Machine Learning Algorithm, Deep Learning and Big Data) on Human Capital Management in Indonesia. This study aims to determine the effect of artificial Intelligence (AI) on Human Capital Management in Indonesia. This sample of this study is 85 respondents of organizational leaders and human resource managers (HR) in Indonesia. It can be concluded that adoption of Deep Learning and Big Data has a significant positive impact on Human Capital Management.

Keywords: Artificial Intelligence, Big Data, Deep Learning, Human Capital Management, Machine Learning Algorithm

INTRODUCTION

Entering the digital era and the era of society, there is a paradigm shift in the need for human skills in various aspects and activities. This has changed many aspects of the organization, including the digital shift in HR, where it cannot be denied that HR in organizations in the current era is capital for organizations and their performance is the main indicator for organizations to achieve their goals (Van Marrewijk & Timmers, 2003). Artificial Intelligence will have an impact on the income of companies and even countries because, of course, this intelligence can achieve workforce productivity by increasing routine tasks and expanding employee skills and increasing the value of their work. The high influence of artificial intelligence that can solve cognitive problems, according to Ernst & Young estimates will replace almost 9% of human work and will change the need for production and service jobs to be easier, product quality to be better, and time efficient (Polak, 2021). Various studies have stated that Human Capital Management can be defined as a human management approach that emphasizes alignment between individuals and organizations

systematically analyzed as overarching strategic topics, measures, and evaluates policies and implementation activities to create value (Zeb et al., 2018).

These are some of the characteristics of Industry 4.0's globalization era: automation and robotics are like muscles; augmented and virtual reality (AR/VR), cameras, and other sensors are like intelligences; and connectivity and data are the fundamental nervous system. AI, on the other hand, is its true brain. The study of the design of computer systems with intelligence comparable to that of humans is known as artificial intelligence (AI) (Mariska et al., 2021). Based on the results of the Kominfo Survey in 2017 revealed that more than half of Indonesians are smartphone users (Sari et al., 2020), in addition, based on VMWare research related to innovative digital services, it was found that the Indonesian people have gained a better appreciation of the role of technology in creating value over the past year, a large amount of data has the potential for organizations to penetrate the market for AI-enabled products and services. Based on the "SEA- List of Most Well–Funded Startups" data

from The Indonesia Digital Lookbook in 2021, four out of eight startups based in Indonesia dominate the list. Grab took first place with additional help from Indonesia-based Emtek and other recently funded startups including Bukalapak and J&T. StartupIndonesia.co as the data provider focuses on startups in Indonesia. StartupIndonesia.co builds the first online startup database in Indonesia while connecting startups with investors. Its machine learning algorithms can predict a company's early-stage investments – providing a data-driven approach when "matching" stakeholders with relevant startups. Indonesia is also wearisome to completely arrive the digital era, with "APBISDI: Association of Digital Business Professionals" as a legal entity organization that houses the profession and expertise in fostering and developing professional practice, especially in the field of Digital Business. With the growth in terms of industry, education, and technology, Indonesia has the advantage of being the spearhead toward Industry 4.0 through human resource development.

A company has a responsibility to its stakeholders to do the work and earn the desired profit. A manager as an agent must be able to manage resources through various activities in increasing the value of employees as company assets. Human capital management is increasingly needed today, through the development of HRM into eHRM as an innovation in the era of globalization, the e-HRM system can improve company performance, especially in terms of cost control and customer satisfaction. The increase in the company's performance, in the end, can also encourage the company's sustainability level (Bag et al., 2022).

The results of this study can be used by Indonesian researchers and organizations to take action to increase the value of human resources. Observations from this study may be useful, especially for educational institutions that act as Centers of Excellence to contribute to the educational syllabus that will create a more holistic growth of human resources. In addition to AI development, it is important to ensure the readiness or competence of HR to adjust to these variations mentally, because AI will quicken the management of organizational transformation, and training in new skills is needed in order to adapt to the future industry marketplace transition. This research will offer context about approximately of the original thoughts about change and the approaches needed that can help in Human Capital Management in Indonesia. The core objective of this research is to provide further explanation of the effect of AI on Human Capital Management in Indonesia and how it can have a positive effect on competitiveness by adopting the best management theories and strategies to minimize negative effects.

LITERATURE REVIEW
Artificial Intelligence (AI)

Artificial Intelligence (AI) is a field of study that describes machine learning capabilities that can deliberate and performance alike humans. According to the AskAboutAI report from Getting Smart, the idea behind AI is that machines can demonstrate human intelligence. The idea of AI started in 1956 when calculations were utilized to surmise information and perform activities or complete assignments (Purnomo et al., 2020). The concept of AI refers to the creation of hardware and software with artificial intelligence that mimics human behavior. Devices are generally purpose-built to have the ability to learn and solve problems (Sharma et al., 2020). Computer based intelligence is essentially PC code that shows a type of insight, learning and critical thinking known as genius. AI is the development of computers that can solve problems by learning them on their own and continuously improving on previous repetitions. AI gets smarter, acquaintance grows, and it increases the potentials to function appropriately and insightfully and benefit society and its environment.

Human Capital Management

Human Capital Management (HCM) is a human resource management technique that focuses on company investments that aim to increase the economic value of employees. This HCM concept emerged due to the shift in the role of HR, that humans are intangible assets that have many advantages. Based on Jac Fitz-enZ's book The ROI of Human Capital, This move to measure human capital reflects the shift in the role of HR management from a manager to a strategic business partner (Brazen, 2004). The main concept of human capital is that people are not just resources, but income-producing capital, and any expenditure made to develop the quality and quantity of capital is an investment activity (Caire & Becker, 1967). The focus of Human Capital is investing in human resources, namely meeting the needs of human resources to develop knowledge and skills or skills (Khatri et al., 2020). Some of the duties of an HCM are (1) Recruitment; (2) Onboarding; (3) Training and Development; (4) Retaining Employees; (5) Assessing Employee Performance; (6) Managing Data. Human capital is made up of five parts: leadership, organizational culture, individual skills, and team effectiveness are all important. The company's value is ultimately determined by how each component contributes to the creation of the company's human capital (Endri, 2010). This research will examine based on the application of AI in organizations or companies, how Human Capital can cooperate with technology to generate viable advantages. It is important for leaders to be able to design strategies in Human Capital Management in the Digital era, considering that as capital, the character of HR can change differently

from other resources. In order to optimize the management and retention of human resources, it is important for management to understand and reduce barriers by recruiting appropriate employees, retaining skilled employees, and motivating employees.

Critical Reviews of Current Research

In the face of expected technological changes, it is important for organizations to be prepared. Organizations must ensure that their workforce remains stable and skilled through these changes, understand which skills will be important in the near future, and hire appropriate employees (Clarke, 2008). In fact, in its application, AI will create new jobs for humans, which are not yet available. The existence of these new jobs is also accompanied by the transformation of skills needed in a work-based environment, both in the areas of technical skills such as programming as well as soft skills such as skills to adapt and learn and technology design. The high demand for soft skills indicates that AI-based technology still requires the role of humans, not replacing humans (Leitner-Hanetseder et al., 2021). Therefore, it is important for organizations to involve and respect the opinions of HR in the application of AI as a tool in the organization, which must be accessible and easy to use. These aspects will help create acceptance by HR. Organizations should establish several policies to ensure ethical and legal practices for the use of AI. This policy should address data governance, accountability, and a roadmap for dealing with AI system malfunctions.
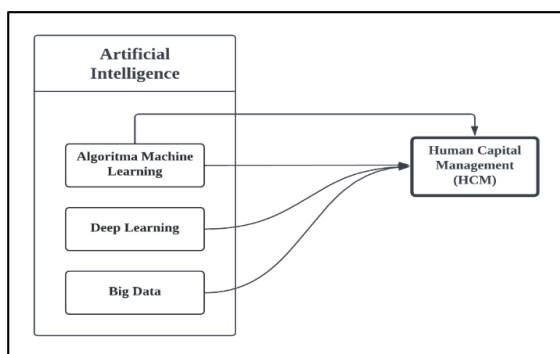
Conceptual Framework and Hypothesis

Figure 1. Conceptual Framework

The methodical study of algorithms and statistical models that computer systems use to carry out precise tasks without being explicitly programmed is known as machine learning. For example, whenever a web search engines such as Google are used to search the Internet. One of the reasons it works so well is that it learns algorithms that have learned how to rank websites. These algorithms can be put to use in many ways, including predictive analytics, image processing, and data mining. Once an algorithm learns how to process data, it can carry out its tasks automatically, which is a key advantage of machine learning. The main advantage is that it allows managers to obtain real information which can support managers to form strategic decisions regarding human capital management (Lengnick-Hall & Moritz, 2003).

H_1: Adoption of Machine Learning Algorithm positively impact on Human Capital Management

Deep learning is an AI-enhanced machine learning technique that goes far beyond in its capacity to understand syllables and images, speech recognition, computer vision and natural language processing, and various industrial products. Artificial neural networks are part of the latest advances that utilize AI algorithms to understand and study human capital habits by stimulating the structure of the human brain known as a neural network (Mahesh, 2020). Human Capital and AI work seamlessly through nervous networks, the main motorist overdue the collaboration is the availability of large amounts of data in the cloud (storage) though leveraging big data and data analytics that allow data to be construed and used with the aim of improvement. The adoption of deep learning, among others, can increase HR productivity, thereby increasing the productivity of the company's organization, reducing time wasted in collecting, sorting, and compiling applications from applicants, defining the possible of each employee in ensuring individual profession growing, and so on (Mishra & Gupta, 2017).

H_2: Adoption of Deep Learning positively impact on Human Capital Management

Human capital management can be overcome with big data, and HR can improve the overall performance of an organization. The way data sources assess HR performance in real time helps identify and develop knowledge that contributes to organizational performance and helps strengthen organizational capabilities (Akinyede & Daramola, 2020).

H_3: Adoption of Big Data has a positive impact on Human Capital Management

METHOD

The purpose of this research is to find out the impact of AI on Human Capital Management in Indonesia. Research using positivist basic assumptions consists of several observations such as from knowledge (epistemological assumptions), real events or situations that occurred during the research period, how the researcher assesses the impact on the research process (ontological assumptions), and the extent to which the researcher's assessment has an impact on the research. (Axiological assumptions). These assumptions figure the research questions, the

170

methods used, and the interpretation of the results (Hamilton & Sodeman, 2020).

As for testing the hypothesis, there are five steps that must be passed to complete a test, namely determining the formulation of the null hypothesis (h0) and the alternative hypothesis (ha), choosing a level of significance (a) and determining the table value, making test criteria in the form of accepting and rejecting h0, conduct statistical tests, and make conclusions in terms of acceptance and rejection of h0, which specifically describes the process based on the matters below.

Research Approach

The main approach of this research is deductive research to develop AI adoption hypotheses. Deductive reasoning begins with a statement or general in the form of rules, regulations, theories, or general statements. Furthermore, the statement will be developed with statements or details that are specific. Researchers will apply a quantitative deductive approach based on numerical data and statistics (Yuhertiana, 2008).

Research Design

The research uses more primary data owed to the limited obtainability of secondary evidence. Surveys are used in research to formulate conclusions. Since AI is still a new domain and data is constantly changing, the primary data methodology is deemed suitable for the literature gap in the current domain. Only relevant data are tabulated while the research is carefully monitored throughout the data collection process.

Method of Collecting Data

Online and offline questionnaires and interviews will be the main data sources in the research and will be conducted in Indonesian or English. The researcher will be accountable for informing all participants of the study objectives and providing guarantees for data concealment.

Data Collection Instruments

A data collection instrument utilized in research is a self-developed questionnaire. The survey provided the participants with their demographic information, and the questionnaire used his 5-point Likert scale format: strongly disagree, disagree, neutral, agree, and strongly agree.

Valid and reliable instruments are needed to obtain reliable research results. The term "valid" refers to an instrument that is capable of measuring the intended value. If the instrument is used multiple times to measure the same thing, it will still produce the same data, making it reliable. Validity and reliability tests need to be carried out on the measuring instrument that will be used in research. The results of testing the validity and reliability of the indicators in this study all use tools computer program SPSS Statistics 22.0. The following is validity testing and the reliability of the indicators of the variables in the research to be tested, can be seen below.

The instrument's use is verified through the validity test. As a result, the instrument can be utilized to measure the actual measurement. The consequences of the instrument are called substantial assuming the information is gathered with information that really happens on the article under study. Valid questionnaire if the correlation value R count > R table. Instrument testing using a sample of 85 people, which is meant to be grain questions in the questionnaire actually have a valid level of validity reliable because the intended value of r table is quite high. The r table for degrees of freedom and the calculated r values are compared during the validity test (df) = n-2, in this case n is the number the sample in this study, namely (n) = 85. Then the amount of df can be calculated with 85-2 = 83. With df = 83 and alpha = 0.05 we get r table = 0.2133 (by looking at the r table at df = 83 with a two-tailed test). As for the rules that applies if the value of r count > r table (0.2133), then the question items in the questionnaire can be said to be valid, and vice versa. Reliability test is used to test whether the instrument is reliably used. Reliable if there are data similarities in the same time different. Alpha Cronbach's analytical techniques are utilized in this method of reliability testing. The consistency in this reliability test was acceptable (0.66), and each of the variables was either good or acceptable.

Population & Sample Size

Participants in this study are anyone who is within the reach of IT and Human Resources from various government and non-governmental institutions in Indonesia. The goal participants must be familiar with digital transformation and human capital in order to fully comprehend the questionnaire in this study, which focuses on artificial intelligence and human capital management. In this study, the questionnaire was distributed to 200 respondents samples taken are expected to be able to represent the population so that it can be easier to collect data needed. Guidelines for measuring samples are determined by the number of indicators used in all latent variables, with 5-10 representing the number of samples. With the number of indicators 15 multiplied by 5, then the minimum number of samples in this study amounted to 75 samples (15 X 5 = 75). The writing team took a sample of 150 respondents to be able to more representative of the population, obtain more valid data, and anticipate an error occurred in filling out the questionnaire to guarantee data consistency through online his questionnaires, resulting in 85 responses.

Data Analysis

The data will be gathered, arranged, and analyzed with the help of the Software Statistical Package for Social Science (SPSS). For further analysis, including regression testing, hypothesis testing, accomplishment descriptive and normality analysis, and support analysis, the data will be imported into SPSS software.

In research, reliability is the degree to which a test's measurement remains consistent despite repeated use on the same subjects and conditions. When research yields consistent results for the same measurements, it is regarded as reliable. If multiple measurements yield different results, it is unreliable. A number known as the value of the reliability coefficient is used to empirically distinguish between high and low reliability. An r_{xx} value close to 1 indicates high reliability. Generally agreed that reliability is considered satisfactory if ≥ 0.700.

RESULT AND DISCUSSION

Demographic analysis (Table 1) shows that the average number of male participants who responded was 47 people and 38 female participants. Most participants were between the age of 20-24 years (64,8%) with less than 1 year of work experience (43,6%) and this can be closely related to the level of maturity.

Table 1. Demographics of Participants

		Frequency	Percentage
Gender	Male	47	55.3%
	Female	38	44.7%
Age Group	20-24	55	64.8%
	26-35	24	28.2%
	36-45	4	4.7%
	46-55	2	2.3%
	56 and above	0	0%
Years of Working Experience	< 1	37	43.6%
	> 1	27	31.7%
	> 5 tahun	11	12.9%
	>10 tahun	10	11.8%
Number of Employees	1-49	43	50.6%
	50-249	19	22.3%
	250-499	5	5.9%
	500 or more	18	21.2%
Field of Activity Sector	Administration and Service	22	25.9%
	Construction	5	5.9%
	Communication and Technology	14	16.4%
	Manufacture	5	5.9%
	Wholesale Trade	7	8.2%
	Education	10	11.8%
	Food and Beverage	1	1.2%
	Creative Industry	1	1.2%
	Audio Visual	1	1.2%
	Mining	1	1,2%
	Banking	1	1.2%
	Limited company	1	1,2%
	Travel	1	1.2%

	Frequency	Percentage
Pharmaceutical industry	1	1.2%
Power Generation and Provision	1	1.2%
Inspection and Laboratory	1	1.2%
Health	1	1.2%
Digital Service	1	1.2%
HR Staff	1	1.2%
Teacher (Retired)	1	1.2%
Airport Services	1	1.2%
Internship	1	1.2%
Food and Bakery	1	1.2%
Student	1	1.2%
Creative	1	1.2%
Business	1	1.2%
Telecommunications	1	1.2%
Total Response = 85		

The writing team presents data processed from research results in the form of tables which include data about respondents' ratings regarding Artificial Intelligence and Human Capital Management in Indonesia, a sample study on HR that can represent respondents in a company in the industry.

Table 2. Relationship Level

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.661[a]	.437	.415	1.21929

The value of Sig F. Change is .000 (<0.05), it can be concluded that Machine Learning Algorithm, Deep Learning, and Big Data variables have a significant connection to Human Capital Management concurrently. The R-value (Correlation Coefficient) is 0.661, so it can be concluded that the level of relationship between Machine Learning, Deep Learning, and Big Data simultaneously has a strong relationship.

Table 3. Hyphotesis Testing

Model	Unstandardized Coefficients		Standardized Coefficients		
1	B	SE	Beta	t	Sig.
(Constant)	2.091	1.297		1.612	.111
Machine Learning (X1)	.072	.069	.097	1.046	.299
Deep Learning (X2)	.225	.079	.309	2.857	.005
Big Data (X3)	.329	.082	.401	3.988	.000

For t test, variable X has an effect on variable Y if the sig t value is less than 0.05. Variable X has no effect on variable Y if the sig t value is greater than 0.05.

Adoption of Machine Learning Algorithm Positively Impact on Human Capital Management. First Hypothesis Testing, it is recognized that the sig t value for the influence of Machine Learning Algorithm on Human Capital Management is 0.299 > 0.05 so it can be decided that there is no significant effect of the Machine Learning Algorithm on Human Capital Management. Looking at the results of Standardized Beta Cofficient 0.097, it means Machine Learning has 0.97% positive impact on Human Capital Management.

Adoption of Deep Learning positively impact on Human Capital Management. Second Hypothesis Testing is accepted, because the sig t value is 0.005 < 0.05 for the effect of Deep Learning on Human Capital Management. As the Standardized Beta Coefficient value of 0.309 indicates has a positive effect on Human Capital Management of 30.9%.

Adoption of Big Data Has a positive impact on Human Capital Management. Third Hypothesis Testing is accepted, because sig t value is 0.000 < 0.05 for the influence of Big Data on Human Capital Management. Big Data has a positive impact of 40.1% on Human Capital Management.

Discussion

Based on Table 2, it is found that the value of Sig F. Change is .000 (< 0.05), it can be concluded that Machine Learning Algorithm, Deep Learning, and Big Data variables have a significant impact to Human Capital Management concurrently. The R-value (Correlation Coefficient) is 0.661, so it can be concluded that the level of relationship between Machine Learning Algorithm, Deep Learning, and Big Data simultaneously has a strong relationship. There are quite interesting differences between this study and previous research, where previous research conducted by other researchers was carried out in Malaysia, and gave different results, namely in research in Malaysia it was the Deep Leaning variable that was considered not vital and had a hypothesis that was rejected against Humans. Capital Management, meanwhile in Indonesia. Precisely the adaptation of Machine Learning which is based on results does not have an impact or influence on Human Capital Management. This means that the implementation of AI is very dependent on the dynamics of human resources in a particular area.

Artificial Intelligence is still a novel area and phenomenon that is used in the industry in Indonesia, so it needs to garner a lot of consideration from several establishments. There are not many studies on this matter, so it is hoped that the results of this study can be used by researchers or organizations in Indonesia to increase the charge of human resources with applicable strategies. The observations since this research can be useful, especially for educational institutions that act as Centers of Excellence to contribute to the educational syllabus that will create a more holistic growth of human resources. Because

AI will accelerate the management of organizational change, and training in new skills is required to adapt to the future labor market transition, it is important to ensure that HR is ready or competent to adapt psychologically to these changes. In order to aid Indonesia's Human Capital Management, this study will provide context for a few novel concepts about change and the necessary approaches. The primary goal of this study will be to provide additional explanations regarding the impact of AI on Indonesian Human Capital Management and how it can have a positive impact on competitiveness by adopting the best management theories and strategies in minimizing negative effects.

Based on the observations from this research, it can be useful, especially for educational institutions that act as Centers of Excellence to contribute to the educational syllabus that will create a more holistic growth of human resources. Especially in the industrial realm, the use of artificial intelligence is well understood for various industrial sectors in Indonesia as a form of system collaboration and skills to support HR, especially in terms of Human Capital Management. Artificial Intelligence Adaptation in this case Machine Learning, Deep Learning, and Big Data can significantly improve Human Capital Management. Referring to the results obtained, so far it can be thought that Artificial Intelligence has recompenses and there are no shortcomings in the realm of Human Capital Management. Several industries in Indonesia, the true impact on employment is already evident. There are several uses of AI that can be studied by human resources at this time and can be introduced by the University to its students, such as the use of ERP or how to make a CV with the ATS Friendly Method, and other strategies will be discussed in subsequent studies.

Conclusion

It can be concluded that adoption of Deep Learning and Big Data has a significant positive impact on Human Capital Management. Research on technology and its relation to HR, especially AI, is considered very suitable to be carried out in Indonesia, which is starting to adapt and implement the application of AI in various companies and industries. However, there needs to be further research on what kind of technology or application has been used so that people can better understand this topic. Carrying out this research in Indonesia at this time may require challenges due to limited human resources who understand AI capabilities, so in selecting respondents, researchers are expected to be more selective and with a better timeframe. We are well aware of the deficiencies that exist, because AI is a new topic in Indonesia and it is not easy to find references. However, by focusing on respondents who have limited understanding of AI and also the application of AI in their companies, this can be done in a structured manner to ensure the consistency and

validity of the research data. With reference based on the results of this research, and all the potential of AI and technological developments that can help human resources in the future in Indonesia, hopefully further research can be carried out which discusses various examples of the implementation or application of AI in companies with a larger population in the industry to produce more accurate research results.

REFERENCES

Akinyede, R. O., & Daramola, O. A. (2020). Neural Network Web-Based Human Resource Management System Model (NNWBHRMSM). *International Journal of Computer Networks and Communications Security*, *1*(2013), 75–87. https://doi.org/10.47277/ijcncs/1(3)2

Bag, S., Dhamija, P., Pretorius, J. H. C., Chowdhury, A. H., & Giannakis, M. (2022). Sustainable electronic human resource management systems and firm performance: an empirical study. *International Journal of Manpower*, *43*(1). https://doi.org/10.1108/IJM-02-2021-0099

Brazen, L. (2004). The ROI of Human Capital: Measuring the Economic Value of Employee Performance. *AORN Journal*, *80*(6). https://doi.org/10.1016/s0001-2092(06)60696-0

Budiastuti, D., Bandur, A. (2018) *Validitas Dan Reabilitas Penelitian*. Jakarta: Mitra Wacana Media.

Caire, G., & Becker, G. S. (1967). Human Capital, A Theoretical and Empirical Analysis with Special Reference to Education. *Revue Économique*, *18*(1). https://doi.org/10.2307/3499575

Clarke, M. (2008). Understanding and managing employability in changing career contexts. *Journal of European Industrial Training*, *32*(4). https://doi.org/10.1108/03090590810871379

Endri. (2010). Peran Human Capital Dalam Meningkatkan Kinerja Perusahaan: Suatu Tinjauan Teoritis Dan Empiris. *Jurnal Administrasi Bisnis*, *6*(2), 179-190

Hamilton, R. H., & Sodeman, W. A. (2020). The questions we ask: Opportunities and challenges for using big data analytics to strategically manage human capital resources. *Business Horizons*, *63*(1). https://doi.org/10.1016/j.bushor.2019.10.001

Khatri, S., Pandey, D. K., Penkar, D., & Ramani, J. (2020). Impact of Artificial Intelligence on Human Capital Management in Malaysia. *Advances in Intelligent Systems and Computing*, *1016*(January).

Leitner-Hanetseder, S., Lehner, O. M., Eisl, C., & Forstenlechner, C. (2021). A profession in transition: actors, tasks and roles in AI-based accounting. *Journal of Applied Accounting Research*, *22*(3). https://doi.org/10.1108/JAAR-10-2020-0201

Lengnick-Hall, M. L., & Moritz, S. (2003). The impact of e-HR on the human resource management function. *Journal of Labor Research*, *24*(3), 365-379 https://doi.org/10.1007/s12122-003-1001-6

Mahesh, B. (2020). Machine learning algorithms-a review. *International Journal of Science and Research (IJSR).[Internet]*, *9*.

Mariska, B. P., Prasetyo, Y., & Fadhilah, F. (2021). Perception and Prospective Analysis of Artificial Intelligence on Human Capital and its Impact on Human Resources in The Industrial Revolution Era 4.0. *Enrichment: Journal of Management*, *12*(1), 146–151. https://doi.org/https://doi.org/10.35335/enrichment.v12i1.172

Mishra, C., & Gupta, D. L. (2017). Deep Machine Learning and Neural Networks: An Overview. *IAES International Journal of Artificial Intelligence (IJ-AI)*, *6*(2). https://doi.org/10.11591/ijai.v6.i2.pp66-73

Polak, P. (2021). Welcome to the Digital Era—the Impact of AI on Business and Society. In *Society* (Vol. 58, Issue 3). https://doi.org/10.1007/s12115-021-00588-6

Purnomo, M., Maulina, E., Wicaksono, A. R., Rizal, M., Program, D., Raya, J., Sumedang, B., 21, K. M., Jatinangor, K., Sumedang, K., & Barat, J. (2020). Analysis of the Use of Artificial Intelligence Technology on Digital Startups in Indonesia. *Artificial Intelligence Technology on Digital Startups in Indonesia Article in International Journal of Advanced Science and Technology*, *29*(3).

Sari, I. P., Permana, F. C., & Firmansyah, F. H. (2020). *Design of Digital Interactive Encyclopedia "Palembang Songket Decoration" as Media Education Introduction Wastra Indonesia*. https://doi.org/10.2991/assehr.k.200321.048

Sharma, U., Tomar, P., Bhardwaj, H., & Sakalle, A. (2020). *Artificial Intelligence and Its Implications in Education*. https://doi.org/10.4018/978-1-7998-4763-2.ch014

Van Marrewijk, M., & Timmers, J. (2003). Human Capital Management: New Possibilities in People Management. *Journal of Business Ethics*, *44*(2). 171-184 https://doi.org/10.1023/A:1023347715882

Yuhertiana, I. (2008). Paradigma Positivis : Sebuah Tinjauan Epistemologi Penelitian Ekonomi. *E-Journal UPN Jatim*.

Zeb, A., Hazana Abdullah, N., Javaid, M., & Asad Khan, M. (2018). Impact of Human Capital Management Practices on Employees' Job Performance. *Journal of Physics: Conference Series*, *1049*(1).