Journal of Posthumanism

2025
Volume: 5, No: 6, pp. 219–231
ISSN: 2634-3576 (Print) | ISSN 2634-3584 (Online)
posthumanism.co.uk

DOI: https://doi.org/10.63332/joph.v5i6.1979

The Impact of Applying Artificial Intelligence-Based Systems on Human Resources Costs in Light of The Environmental Challenges

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Abstract

This study aims to discover the impact of applying and analysing artificial intelligence (AI) systems on melasma in several companies across the energy, oil and gas sectors. The information collected for this study was examined using a sample of executives, experts, management accountants and engineers. A questionnaire was designed to investigate a random sample of (132) questionnaires. A statistically large impact was found on the relationship between systems based on artificial intelligence and the costs of human resources given the occurrence of certain environmental challenges. The implications of the study reveal a need to provide the knowledge and skills that are quite essential for creating new jobs among individuals working to apply artificial intelligence at work, in a way that helps them use smart technologies to evade the occurrence of certain nonconformities in reports and to undermine the undesirable effect on the decisions of the company and related parties involved.

Keywords: *Artificial Intelligence, Artificial Intelligence-Based Systems, Human Resource Costs.*

Introduction

When the scientific and industrial revolutions began, the globe saw significant changes in several sectors. For instance, the field of technology advancement, and particularly the uses of artificial intelligence, is revolutionising both society and human life. While the use of Artificial intelligence (AI) become widespread at the private and public levels, its supreme aim is to identify, describe and classify human intelligence using creating programs.

Since computers are highly intelligent machines that can execute a wide range of processes electronically and swiftly give users the data and knowledge they need to make decisions, they may mimic human conduct (Kozhakhmet, 2012). For that reason, Artificial intelligence represents a modern generation of technologies. In the early 21st century, man started to deepen the field of Machine Learning and built models which could think and act in compliance with man's feelings and actions. Stated differently, the vast army of machines reflects a tremendous capacity for self-learning and accomplishing some of the tasks carried out by the human brain, such as creating and acquiring useful knowledge, making decisions, coming up with novel ideas or images, and recognising multiple networks of relationships.

Artificial intelligence comprises four different aspects: the dimensions of intelligence, programming, research and business (Carol & Leary, 2013), a delegation that has emerged applications for artificial intelligence and the multiple systems it contains. It can be used in

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managing human resources functions and costs, and in light of those developments in the field as mentioned above many challenges have emerged that hinder the application of these innovations, which require addressing them overcoming these challenges leads to increased efficiency, productivity, flexibility, security, and improved performance and achieving a competitive advantage for companies (Dalmarco et al, 2019).

New technologies based on artificial intelligence will also significantly transform current professional jobs within a very short period, software robots have automated processes and routine work. It will also play a major role in unfamiliar tasks, which dictate making decisions regarding intricate and novel situations (Leitner-Hanetseder et al., 2021). Therefore, the current study seeks to address and clarify the impact.

The use of intelligence shown by computer-based systems reduces human resources costs, as developments necessitate them these technologies result in similar developments in the procedures for these costs required by the nature of those developments.

Research methodology.

Research Problem

The technological revolution has massively contributed to altering the perception of several corporations concerning the way of planning and managing their own business. Because of that,

this led to constructive effects on the conventional tasks of man resources, which are embodied in activities such as development, compensation, training and recruitment. Even though artificial intelligence-based systems are not actually brand new, the implementation of such kinds of systems requires hard work to reach advanced stages along with the availability of sophisticated tools and skills to cope with such vast developments.

Research Objectives

This study seeks to:-

1-Identify artificial intelligence's nature and the systems based on it.

2- Identify the requirements for applying techniques of artificial intelligence.

3- Identify the relationship between artificial intelligence-based systems and the costs of human resources.

4- Identify the cons and pros of applying artificial intelligence-based systems.

Significance of the Study

The goal of this study is to comprehend how artificial intelligence-based systems affect human resource costs. Because this topic is relatively new and there are not many research articles on it, the current study is thought to be among the few that addressed it. As a result, it can enhance theoretical understanding and provide information for future research on the topic of artificial intelligence and its effects on the costs of human resources.

Research Hypotheses

Two primary hypotheses form the basis of this study.:

H1: As the subsequent sub-hypotheses diverge from them, there is a statistically significant influence link between the artificial intelligence-based systems and the expenses of human resources:

There is a statistically significant impact relationship between artificial intelligence-based, systems and

H1-a: Recruitment and employment.

H1-b: Training and development.

H1c: Compensation.

H2: When environmental difficulties are present, there is a statistically significant influence link between the cost of human resources and artificial intelligence-based systems.

Literature Review

1. Helene and Tone (2016) looked into whether business intelligence technologies were accepted and used in management accounting decision-making. The findings showed that system user features, tasks, and characteristics were agreed to be important factors in ensuring that business intelligence systems are accepted and used. Additionally, the features of the current system and the characteristics of the user do not align with what the user needs to obtain business intelligence solutions, which has a significant impact on the calibre of decision-making.

2- A study made by Gungor (2020) indicated that artificial intelligence generates great value for companies, a short questionnaire was conducted on 105 mainly business professionals in Europe regarding their understanding of the risks and value of artificial intelligence, and the results of the survey indicated creating perceived value using AI is generally for shareholders (7.39) on 0-10 scale and for (7.15) customers, while society and employees were viewed on it's negative.

3- The impact of artificial intelligence on the accounting industry and the advancement of the accounting profession was assessed by Chukwuani et al. (2020) taking into account the automation of the accounting process and how 21st-century accountants can adapt to automated operational processes in the sector. The emerging outcomes indicated the need for accountants to accept the fundamental changes associated with intelligence applications and artificial technology in accounting systems as the performance in numerous accounting functions will be enhanced by focusing on value-creation activities in accounting performance.

4- A study made by Moll and Yigitbasioglu (2019) examined four technologies related to the Internet that have the potential to alter and develop the work of accountants and scholars in the accounting field will greatly expand soon, and such technologies comprise cloud computing large data, blockchains and artificial intelligence. The study concluded that these technologies will greatly influence the skills and competencies that accountants may need to acquire to perform their daily work.

5-Study developed by Wang et al. (2021) examined how SMEs accomplish the size in central China has developed an intelligent transformation using the use of (AI). Given the fact the distribution is not entirely comparable to resources, several restrictions were imposed on the intelligent transformation of this sort of company in comparison to technologically and

economically cutting-edge companies. The study's main focus revolves around identifying obstacles and drivers. This study indicated that a few external factors such as policy support market and weakness in external AI technology relevance along with internal factors such as organizational development needs, cost implementation, senior management involvement, human resources and prevent smart transformation.

6- Kulkov's study (2021) sheds light on the possibility of using intelligence techniques and artificial technology in healthcare facilities to increase the value provided to customers and assist in making the right decisions as well as enhance the competitive value of enterprises is the main challenge of artificial intelligence in analysing patient data for diagnosis, treatment, and surgical operations.

Current Research and Previous Studies:

Studies conducted in the past have extensively tackled artificial intelligence by defining its significance and necessity for the limits that obstruct smart transformation and its application. However, this study is an extension of earlier research introduced by critics like Moll and Yigitbasioglu (2019) which examined techniques of artificial intelligence, whereas the primary focus of the current study, which was not previously addressed, is the effect of artificial intelligence-based systems only on the expenses associated with human resources.

Theoretical Framework

1. Artificial intelligence:

Artificial intelligence (AI) means the capacity of computer systems to perform and simulate similar functions of human intelligence processes, including learning from past data and experiences, making decisions based on their knowledge, deduction and reasoning, and gathering knowledge and experience to improve performance and achieve goals, and they range AI is widely used in two different fields including data science and data analysis, image analysis and recognition, machine translation, planning and decision making, and automation systems (Jin et al., 2022).

Artificial intelligence is part and parcel of computer science or cloud computing that generates genetic algorithms, systems and specialized programs (Dhamija and Bag, 2020), and intelligence is viewed artificial intelligence is the most influential application of information technology, it is a technology that has undergone unparalleled development over the past decades. A technology like such, however, has been expressed as how machines react to unlike situations and stimuli or in ways which is in full compliance with how human beings start to respond to identical situations or stimuli. In this vein, machines can emerge in a way that can carefully make judgments or make reasonable decisions that are in harmony with human decision-making and judgment (Wheeler & Buckley, 2021).

The various uses of artificial intelligence exemplify a paradigm shift in the way the relationship between companies and their customers is organized through the combination of the physical environment and the digital environment. (Hasan et al, 2021), and artificial intelligence aims to find new ways to extract information, develop the necessary methods for constructing and using information and maintaining it, allowing machines to process different kinds of information in a manner that is associated with human ways, to achieve a better understanding of the nature of human intelligence through simulation, which cannot be done by the human mind, let alone finding advanced ways to translate needs into programs that can be implemented (Boutilier et

al. 2015).

There are two primary categories into which artificial intelligence is divided. First, there is weak artificial intelligence, which is entirely focused on a small number of activities that are either restricted or particular. One example would be the operation of driverless vehicles. Second, artificial general intelligence (sometimes referred to as powerful artificial intelligence). According to Ma and Siau (2018), strong intelligence is primarily capable of carrying out nearly all cognitive tasks in humans, engaging in creative expression, and learning problem-solving techniques. The utilisation of artificial intelligence technology yields several advantages (Wamba-Taguimdje et al., 2020; Tortora et al., 2021). The application of intelligence helps artificial technology increase the use of digital processes instead of physical processes, which allows for increased satisfaction with customers, improving an increasing d productivity, creating new business models and reaching new markets. Moreover, improving the performance of operations and reshaping the commercial and organizational processes of companies and automation is considered one of the most important advantages resulting from the use of artificial intelligence (Ramachandran et al., 2022), as it provides higher production and productivity rates in various sectors and allows for the use of raw materials more efficiently and improved it improves the quality of products and reduces human errors. In addition, artificial intelligence can be used to help companies make better decisions, we conclude that there are many benefits to be gained when working with artificial intelligence techniques, which requires searching for means that help in achieving those benefits by providing the requirements and requirements or working with artificial intelligence applications and techniques.

2. Artificial Intelligence-Based Systems:

Expert Systems:

Expert systems are computer programmes that can imitate how people think in various contexts. It works to solve problems and it can store the knowledge extracted from human experts as well as it can be used in accounting, especially in the areas of auditing, personal financial planning and accounting administration (Hasan, 2022). In the auditing field, a valuable tool for accountants is the expert systems to improve the quality of auditing in several areas such as planning audit programs, evaluating internal control systems, and identifying risks auditing. For the personal financial planning field, the function of expert systems is represented by developing a plan to manage personal financial matters efficiently and effectively, along with managing expenses and income. Achieving sound borrowing, managing investments, organizing taxes, and regarding management accounting expert systems enhance financial analysis and decision-making processes in companies, and could provide expert systems with guidance in several areas, including cost analysis, forecasting, risk analysis, and management projects and quality as well as providing financial advice to improve work in companies.

Neural Networks:

The method of neural networks, in the field of artificial intelligence, teaches computers to process data in a way that is particularly motivated by the human brain. It demonstrates the capacity to learn in a computer program through structural simulation by any automated device because of the neural network (Shukla & Jaiswal, 2013). For robots to carry out the tasks that the human brain does, neural networks are necessary.

Robots:

Robots deal with science and technology and are created to transfer materials, parts, tools, materials or devices using several reprogrammable and programmed movements to implement diverse and different tasks. Robots are specially built and prepared with the facility to examine their atmosphere as humans do (Graetz & Michaels 2015).

Fuzzy Logic:

Fuzzy logic deals with thinking processes that are like human thinking, as it usually takes a decision-making approach that includes a partial truth ranging from false to completely true. Fuzzy logic depends on fuzzy set theory, which shows that a single element is either a member of the set or is not a member of the set group. Since fuzzy logic is capable of automated judgement and decision-making, it is highly valuable for practical and commercial applications. Although it is not accurate, it may be acceptable (Taghizadeh et al., 2013). We conclude from this that many systems are based on artificial intelligence, each of which has characteristics certain matters require their use in a way that suits the nature of the work and in a way that achieves significant benefit at the cost necessary to use it.

Costs of Human Resources Under Systems Based on Artificial Intelligence:

Human capital is a vital element in the process of influencing the success of units operating in various sectors of economy and service, as the high level of human capital performance necessarily leads to an increase in the level of effectiveness of the units. With the development of technology, it was necessary to exploit this development in the process of human resources management (Al-Rawahna, 2013). The process of exploiting technology and its applications serves organizations in managing human resources functions, including recruitment, recruitment, training and development compensation and other functions, and the use of advanced technologies helps to reduce costs and performance improvement as well as improving the quality of services provided, and among the advanced technologies is the emergence big data and digital technologies, which are the product of industry 4.0 (Edwards, 2019). The pressing need and the horizon of possibilities of building quite valuable analytical abilities crafted for human resources have drawn unprecedented attention (Kryscynski et al, 2017). More accurately, big data could be utilized at each stage. In particular, from the recruitment process stages, containing attraction, acquisition, training and development, and after intelligence. Indeed, artificial intelligence is nothing but a product of a kind of advanced technology. Furthermore, human resource management is the principal domain where artificial intelligence is used, and this area of study only considers the influence of expert systems on job appraisal.

Nowadays, the potential of intelligence can be discovered. There are different and numerous scenarios. This includes the search for obtaining CV data, candidate employee lists, job turnover, employee self-service and extracting information (Strohmeier & Piazza, 2015). Artificial intelligence applications might help with sophisticated analytics to find expectations and insights related to human resources. New models would have effects and are critical for training the required competencies.

In the field of recruitment and recruitment, computers are used as a recruitment tool by advertising jobs on a bulletin board service that applicants connect to potential employers, but the tremendous growth in online recruitment requires hiring employers' skills and competencies in human resources management to overcome great difficulties (Punithavathi & Sugavaneswari, 2016).

As for training and development, it is used in electronic devices, applications and processes for creating, managing and transferring knowledge. There are two types of training: synchronous training and asynchronous training (Cheng, 2008). Synchronous training necessitates the attendance of the learners together front the computers to start a debate and discussion between the learners and trainee via chat rooms and/or virtual classes. Regarding the second type, an exchange of information at succeeding times was found. Concerning compensation, special compensation found in place to performs many functions as insurance taxes and calculating compensation for wages by means of issuing payment receipts. Besides, compensation systems notify employees concerning issues and controversies which is closely associated with their financial aspects. Managers can brand estimates related to wages. Undeniably, providing employee with benefits via Internet will achieve substantial savings for human resources management, while electronic procedures management can process changes fast (Khashman & Al-Ryalat, 2015).

The environmental infrastructure accompanying the application of systems based on artificial intelligence:

Despite the many benefits that can be gained from artificial intelligence applications, there are many challenges that may stand in the way of this application (Wang et al., 2021; Goel et al., 2022). Notwithstanding the role of artificial intelligence in many companies is not clearly defined, the lack of sufficient skills has left behind. The capabilities of working individuals to deal with these technologies, financial constraints, and incompatibility with existing systems solutions to artificial intelligence with the company's old IT systems, a high investment with a return slow, as working with artificial intelligence applications requires a huge capital investment in designing the system. It is indispensable to modify the forms of human resources because of the redistribution of tasks and specializations, as well as conducting a series of training on using the features of the new system, and preparing to work with artificial intelligence applications a threat to many jobs and employees, as many industries have witnessed the introduction of robots to replace human workers. From this, we can say that there are many challenges facing artificial intelligence applications this requires the management of companies that wish to use these applications to conduct an extensive study accordingly, it makes decisions regarding whether or not to apply artificial intelligence according to what it deems appropriate.

Practical Aspect:

The study population consists of a group of categories that include executive directors, experts, management accountants and production engineers in oil companies. 150 questionnaire forms were distributed, amounting to of these, 132 questionnaires were valid, i.e. 88%, which is a good percentage suitable for statistical analysis and hypothesis testing. A five-point Likert scale with five weights was used to evaluate the sample members' responses to the questionnaire form, which was utilised as a tool to gather data on the research sample members. (4) Somewhat agree, (3) Agree, (2) Disagree, (1) Strongly disagree, (5) Strongly agree. Using the statistical programme (SPSS), several statistical techniques were used to meet the study's objectives. The level of honesty and reliability in the measures was verified, as well as testing the honesty and reliability of the items of the questionnaire form through the Cronbach’s alpha test as follows: -

Questionnaire’s Validity and Reliability

a. Validity of the scale (internal consistency)

In statistical research, internal consistency refers to how typical each item of a given

questionnaire is with the dimension to which it belongs. In this case, the internal consistency of the questionnaire was evaluated by computing the correlation coefficients between each item and the overall score of the sub-dimension to which it belongs as well as between each sub-dimension and the total score of the central dimension to which it fits.

The correlation coefficients between each human resources cost paragraph and the overall score for the sub-dimension to which the paragraph belongs, as well as between each sub-dimension and the overall score for the main dimension, are shown in Table (1). Given that the threshold of significance was Sig, it is discovered that all correlation coefficients are significant.) Interestingly, the corresponding correlation coefficients are below the test's designated significance level, $\alpha = 0.05$. Consequently, we deduce that the dimension accurately represents the object it was intended to measure.

Pearson correlation coefficients		**Item & its coding**	**Sub-dimension and its coding**	**Main dimension and its coding**
0.898**	0.690**	X111	Recruitment & recruitment x11	Cost HR x1
	***0.662	X112		
	**0.729	X113		
	**0.529	X114		
	*0.628	X115		
	**0.734	X116		
	**0.625	X117		
	**0.632	X118		
0.953**	**0.736	X 121	training & development X 12	
	**0.756	X 122		
	**0.602	X 123		
	**0.278	X 124		
	**0.723	X 125		
	**0.453	X 126		
	**0.764	X 127		
	**0.479	X 128		
	**0.853	X 129		
0.953**	**0.301	X 131	Compensation X 13	
	**0.278	X 132		
	**0.418	X 133		
	**0.660	X 134		
	**0.731	X 135		

	**0.903	X 136		
	**0.870	X 137		
	**0.876	X 138		

Table (1)

Correlation coefficients between each item of human resource costs Rayya, sub-dimensions, and the total score for that dimension

Note: ** indicates the level of significance associated with the correlation coefficient (Sig.) less than α=0.05.

Construct validity is one of the metrics used to assess the validity of the instrument. It helps determine the extent to which the goals of the tool are met and the degree to which each study dimension is strongly correlated with the overall score of the questionnaire questions.

All correlation coefficients in all dimensions of the used questionnaire are shown in Table 1, and they are all statistically significant because their level of significance (Sig.) in relation to the correlation coefficients with the total score of the questionnaire items is less than the test's specified significance level, α = 0.05.

Dimensions	Pearson correlation coefficient
Cost of human resources	0.638^{**}
Artificial intelligence-based systems	0.827^{**}

Table (1-1)

Correlation coefficients between each dimension of the study and the total score of the questionnaire items

** shows the level of significance associated with the correlation coefficient (Sig.) less than α=0.05.

The Questionnaire's Stability

Reliability of a questionnaire is its capacity to yield consistent responses when administered repeatedly. The Cronbach's alpha coefficient was used to determine the research questionnaire's reliability; the findings are shown in Table (2).

Dimensions of the study	Number of paragraphs	The value of Cronbach's alpha coefficient	Self-honesty
Cost of human resources	25	0.85	0.92
Artificial intelligence-based systems	18	0.72	0.85

Table (2): Results of Cronbach's Alpha Coefficient and Self-Honesty

Self-honesty = the positive square root of Cronbach's alpha

According to the data in Table (5), the Cronbach's alpha coefficient has a high value for each dimension. For example, it is around (0.85) for human resource expenses and roughly (0.72) for artificial intelligence-based systems. Additionally, it was discovered that the study's dimensions

gave the value of self-honesty a high appearance, reaching (0.82, 0.95).

Hypothesis Test

In order to test the study hypotheses, the statistical programme (SPSS) was used to estimate a linear regression model and path analysis method described by the dependent variables represented by (human resource costs) and the independent variable represented by (artificial intelligence-based systems). Testing was done on the two hypotheses (H1, H2). The analysis's findings demonstrated a strong correlation between artificial intelligence-based systems and the three sub-dimensions of human resources costs—recruitment and employment, training and development, and compensation—as indicated in Table No (3).

The outcomes of estimating the linear regression model between the polarisation and employment variable and the artificial intelligence-based systems variable are displayed in Table (3).

variable	*Estimates*		Sig	R^2	Adjusted R^2	F		Sig
Fixed limit	$\widehat{\beta_0}$	1.757	0.000	*0.25*	0.246	*45.069*		*0.000*
Recruitment and recruitment	$\widehat{\beta_1}$	0.548	0.000					

Source: Made by the researcher based on the outputs of the Spss v.22 program.

According to Table (3), the model's coefficient of determination reached (R2 = 0.25), meaning that 25% of the changes in the dependent variable could be explained by the model, with the remaining 75% of the changes being caused by other variables that were integrated but not included in the model. using an arbitrary error word. Furthermore, the model appeared to be important. Interestingly, the F test's significance level (Sig = 0.000) is lower than the test's α = 0.05 significance level.

With a value of (0.548) and a significance level (Sig=0.000) less than a 0.05 threshold, the artificial intelligence-based systems variable showed a substantial positive impact on the polarisation and employment variables.

Table (4): Results of estimating the linear regression model for the artificial intelligence-based systems variable and the training and development variable.

variable	*Estimate*		**Sig**	**R^2**	**Adjusted R^2**	**F**	**Sig**
Fixed limit	$\widehat{\beta_0}$	*3.149*	0.000	*0.073*	0.066	*10.579*	*0.001*
Compensations	$\widehat{\beta_1}$	0.156	0.001				

Source: Prepared by the researcher based on the outputs of the Spss v.22 program.

The model was essentially successful in explaining 7.3% of the changes in the dependent variable, according to Table 5's coefficient of determination (R2 = 0.073). The remaining changes (92.7%) were caused by other variables that were not included in the model. A random error term is added into the model. Furthermore, the model appeared significant since the F test's significance level (Sig = 0.001) is higher than the test's α = 0.05 significance level.

The Johanson-Neyman method was employed to test the second hypothesis, which examined the relationship between artificial intelligence-based systems and human resources assignments in the presence of environmental challenges. The results of this test are clearly shown in Table

(6) below.

	coefficient	se	t	p	LLCI	ULCI
constant	2.3423	0.0463	50.5896	0000	1.2324	**3.4453**
Cost of human resources	0.3769	0.1413	2.6670	0.0518	-0.0035	**0.5551**
Environmental challenges	0.7761	0.112	6.3614	0000	0.6392	**1.0443**
Int_1	0.2812	0.0861	3.2659	0.000	-0.0332	**0.6326**

Table 6:

The link between the expenses of human resources and artificial intelligence-based technologies in the context of environmental concerns.

Source: Prepared by the researcher based on the results of the Johanson-Neyman analysis

Table (9) indicates that the findings suggested a link of effect between the independent variable and the direction of human resource costs in the context of environmental problems. This is because, along with the value of (t-test = 3.2659), which indicates the presence of the aforementioned effect and acceptance of the second hypothesis, the value of (β) for the variable (Int_1) was specifically calculated at (0.2812), which is within the bounds of acceptability.

Conclusions and Recommendations

First: Conclusions

1-The emergence of new jobs within the company when applying systems based on artificial intelligence and these Jobs require skills and training for individuals working for these new jobs.

2- Working with artificial intelligence applications helps reduce costs and helps with the accuracy of work and speed in completion.

3-Artificial intelligence is an alternative to human capabilities, due to the automation of many tasks.

4- Working with artificial intelligence applications helps manage human resources costs in the field of training and development, compensation and recruitment Employment, in a way that reduces these costs and helps Make sound decisions related to these costs.

Second: Recommendations

1- There is an urgent need to provide the knowledge and skills necessary for new jobs among working individuals when applying artificial intelligence at work.

2-There is a call for conducting a feasibility study by the units that wish to implement intelligence-based systems Artificial analysis in which the expected benefits are compared with the costs necessary for that application and decisions are made according to the results achieved.

3-The need to conduct development programs and courses for working individuals to enable them to work with artificial intelligence applications had to be addressed.

4- There is an undeniable need for developing artificial intelligence applications in the field of managing human resources costs in a way that leads to sound results and rational decisions.

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