

A Study of the Application of Artificial Intelligence in Human Resource Management

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Abstract

Technology has changed the speed of development in all industries throughout the dynamic and competitive environment worldwide. Artificial intelligence is attributed to a technology that enables industry to develop more rapidly and accomplish achievements more effectively. This technology has entered different scientific fields such as finance, human resources, marketing, production, and Artificial intelligence system enables an organization to enhance its current efficacy. The exploitation of artificial intelligence technology in human resource management has had many challenges and advantages. The present study has tried to investigate about using artificial intelligence in human resource management. Artificial intelligence could easily be applied in all human resource processes. Currently, it is mostly used in recruitment processes, resume assessment, chatbots, and interviews. Many mega-corporations such as Microsoft, Google, and Unilever have been using this technology in their companies during some recent years in order to apply and develop it. The focus of the current study is on a probe of the application of artificial intelligence in human resource management and it was found that it has had a tremendous effect on human resource management issues.

Keywords: Technology, human resource management, organizations, artificial intelligence

1. Introduction

Using artificial intelligence in human resource management may be called the most astonishing event among recruitment scholars in the year 2018. The selection of artificial intelligence in human resource management can be called “a new era in human resources” in a way that artificial intelligence alters the usual and daily tasks carried out by human beings to change the recruitment business. The fourth industrial revolution has led to outstanding changes

in different fields of science such as engineering, medicine, economics, social sciences, and management with the advent and development of novel technologies such as artificial intelligence, internet of things, big data, cloud computing, and block chains. These technologies have created many challenges and opportunities for the organizations through which the recognition and utilization of those technologies can affect the yield, reduce costs, and save time.

The acceptance of novel technologies has been so great that the new era has encountered with a principal change in many aspects. Industry 4 which is also known as the smart industry is considered as the fourth industrial revolution and has been posed by professor Class Shoab (the founder and the administrative manager of worldwide economy assembly) (9).

Smart human resource is a concept introduced within the emergence of industrial revolution 4. Smart human resource includes technologies such as artificial intelligence, internet of things, and big data used through human resource activities. Throughout the competitive environment in fourth industrial revolution, human resources play a vital role in organizations (12).

Digital human resources is attributed to a flexible approach to develop staff and to use the active role of digital environment in simulation of changes and effective use of the experiences and talents of the staff. Unlike the traditional ones, digital human resources focus on increasing the efficiency of the staff and the presentation of innovative resolutions and consider the employees as an asset that should be supported (10).

Artificial intelligence can help us in enhancement of human resource processes such as recruitment, services compensation, training, and developing the staff, decision making prediction, staff's exit prediction, and many others in an organization. The enhancement of human resource management efficiency through the use of artificial intelligence has been changed into an important process in developing the future human resource management trends (8).

Some of the capabilities of artificial intelligence for human resource management are as follows:

- 1) Automated performance of repeated tasks and saving time and the appropriation of time for more strategic works
- 2) Video analysis of the applicants and recognition of their face states, stress, topic awareness, body language, and effective communication capability through deep learning techniques and finally the selection of the best applicants for recruitment
- 3) Designing a supportive smart decision making system, using neural network techniques to create a just system for the assessment of wages and salary (3).

Therefore, regarding the importance, utilization trend, and the development of artificial intelligence inhuman resource management in many organizations and the international companies, we have tried through the present research to review the documentations and utilize digital human resource management to investigate about using artificial intelligence in different processes of human resources using data based human resources, advantages and tools in artificial intelligence in human resources. The results of the present study can help us in recognizing the vast use of this technology in Iranian organizations and companies.

In this study we have dealt with a complete review of the application of artificial intelligence in recruitment, training, services compensation, future staff behavior prediction, talent management, and performance assessment.



Fig.1. The impact of artificial intelligence on project management

The importance of artificial intelligence in project planning

A project consists of a set of tasks designed to achieve a specific goal. A project can be developing a new product or service, building a bridge or building, renovating a house, updating a data system, implementing a new business, etc.

Regardless of the nature and size of the assignment, every project manager strives to meet the project's objectives, i.e. deliver it within the set time and budget. Effective project planning paves the way for its success.

Project planning is one of the basic components of project management. Determines the scope of the project and determines the goals to achieve them. The project plan includes how to implement, monitor, control and close the project. The plan should include any project constraints, including costs, risks, resources, and deadlines. The project plan consists of six basic steps:

- Create task list
- Formation of the budget plan
- Preparation of risk management plan
- Produce a communication plan
- Preparing the project schedule

- Allocation of appropriate resources for appropriate tasks

Artificial intelligence-based tools help project managers perform various tasks at each stage of the project planning process. It also enables project managers to process complex project data and discover patterns that may affect project delivery. AI also automates most redundant tasks, thereby increasing employee engagement and productivity.

According to Gartner, artificial intelligence will eliminate 80% of the manual tasks of project management today by 2030. AI machines handle everything from programming to data collection, tracking to reporting, and more.

Artificial intelligence in project management

From scheduling to analyzing work team patterns, AI has become a clear advantage for project managers.

Here are some of the applications of artificial intelligence that help with the project management cycle:

Knowledge-based expert systems KBES system

A knowledge-based expert system is a computer program that represents the

knowledge and analytical skills of one or more human experts on a specific problem. This system captures the human expert's experience and encodes it into the computer so that any user can understand it.

The KBES architecture diagram

The knowledge engineer or human expert gives the information to KBES. This information is often declarative, for example, the expert states some facts, rules or relationships in the knowledge base. The inference engine then uses the knowledge base as a data file to determine knowledge and provide output.

2. Human Resource Management

When we speak about human resources, a project manager should make sure that all team members required are adjusted for the project development. He acts both as the leader and the manager. This means that the project manager should make sure that he has access to the required training team, development, materials and equipment, appropriate relationship between the beneficiaries, technical and spiritual supports and also he can get proper rewards for activities being developed and the climax of achievements he gets (14).



Architecture of a KBES

2.1 Planning and estimating human resources

Based on the report by Project Management Institute (2017), first the project manager is responsible to identify the intended project team members in project planning stage. Then he should recognize and identify the roles required by team members such as authorities, responsibilities and merits. Also he is responsible to estimate the required work force to carry out all the needed tasks.

To do so, project managers use a set of instruments and techniques to foster the decision making process which includes expert judges, bottom-up estimation, similar estimation, parametric estimation, data analysis, project management information system, and meetings. But he

is not confined to what were proposed above.

The efforts carried out in planning and the different stages following that comprise the project have a great effect on increasing the success and efficiency of the project (1).

2.2 Human resource absorption

After making decisions on the required resources, it is the project manager who should absorb a team of experts with certain capabilities for investment in administration stages. To absorb the members for this team, the project managers make decisions using multiple variables analysis method to choose potential staff. These criteria include cost, capability, experience, knowledge, skill, outlook, and environmental factors related to geographical position, time zone, and the capability to create connections (14).



Fig.2.Systematization of artificial intelligence and recruitment of human resources

2.3 The development and management of human resource team:

When the required team is prepared, it is the project manager's responsibility to make sure to receive an appropriate development team that entails the improvement of team merits, team environment, and the interactions among team members.

To guarantee high throughput and output for each team, the project manager should make sure that the appropriate training and merit development have been guaranteed for project team. This can be achieved through preparing online classes, coaching sessions or instructions, or even in service training (14).

Communication is another important factor that should be included in team management because it lets the project manager to follow team development, to present in time and outstanding feedback, and also he can make sure that the team members get all required emotional and technical supports and cultivate their sacrifice (14). The inclusion of team

members in decision making sessions and during team making activities can enhance relationships.

The creation of appropriate work environment to increase the satisfaction and performance of the staff and applying the required changes in the team are highly important in projects. The project managers can present the challenges and opportunities, feedback and in time support when required, and recognize and reward for good performance (14).

The study carried out by Thamhain (11) showed that the appropriation of challenging professional tasks and the presentation of proper support for project teams increase their commitment and reduces communication obstacles and fight dangers and enhance the overall project team performance. Also the project manager should assess the development and quality of the works during team management because it provides an understanding of the weak points and strengths of a team or a member of a certain team.

3. Research Method

The present study is a documentary review of the research carried out in the field regarding the use of artificial intelligence in human resource printed in international journals. Based on the major goal in the present research which deals with the identification of the use of artificial intelligence in human resource management, the studies carried out since 2017 and included in different databases were investigated (Wiley, Sage, Science Web, Google scholar, digital human resource (HR), Artificial Intelligence (AI)

and human resource (HR)). To search for the related literature in the field required to carry out the current study during one month, the following keywords were

searched in databases mentioned: artificial intelligence and human resource management, data driven HR, AI, AI tools in HR.

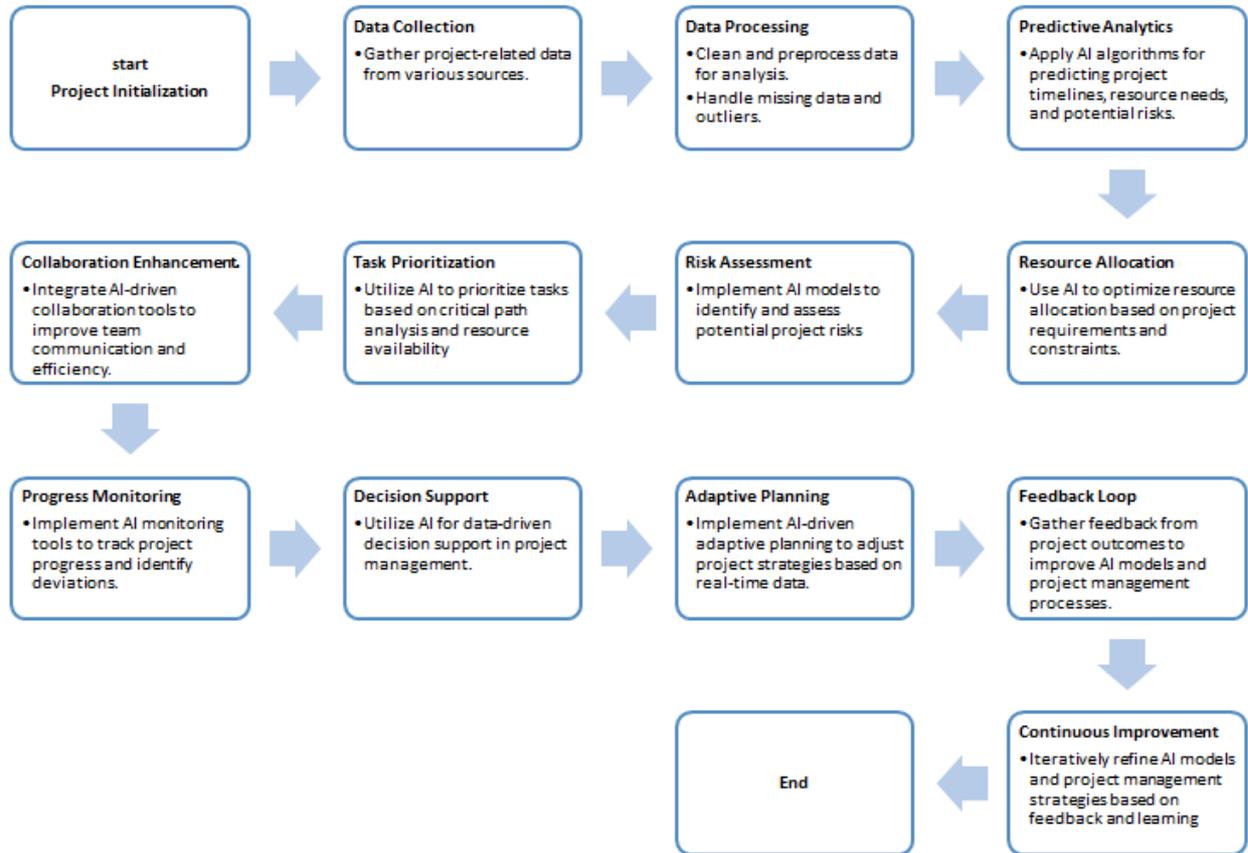


Fig.3. AI in project management flowchart

4. Findings

Artificial intelligence exists everywhere. It includes smart and driverless vehicles to communication bots that talk with customers without the customers being informed that they are not talking with a human being (5). Tom Stechora, the vice for talent recognition and individuals' analysis in IBM Company has explained artificial intelligence as: "it is a facilitator that helps us to present appropriate talent in time and achieve personality" (2). From among the subcategories of artificial

intelligence we can refer to machine learning, deep learning, natural language processing, and neural networks each of which can help us in some of human resource processes. According to the studies carried out in the field, 76 percent of organizations believe that artificial intelligence has had a considerable effect on workforce absorption and this has resulted in artificial intelligence being considered as a necessary tool in human resource (7). The use of artificial intelligence in human resource is different

from what is done in reality. This technology helps human beings to understand staff instead of controlling them. This technology can lead to higher yields and greater satisfaction of the staff and reduces their job leave (8).

In table 1, some of effects of artificial intelligence on human resource management related to peruse and post use stages of the utilization have been mentioned.

Table 1: The effects of artificial intelligence and some of human resource processes (4)

Process	Before using artificial intelligence	After using artificial intelligence
Recruitment	<ul style="list-style-type: none"> - Time consuming - Manual - Bias in decision making in some cases 	<ul style="list-style-type: none"> - Increasing recruitment quality - Saving the time and cost - Decision making without bias
Training and development	<ul style="list-style-type: none"> - Training through experienced professors - Longer time and longer processes - Very costly - Low feedback 	<ul style="list-style-type: none"> - Individualization of training through machine learning - High speed training - Accessibility of feedback at anytime - Low costs
Services consumption	<ul style="list-style-type: none"> - Unjust payment system - Group rewards - Delays in processing - High operational costs 	<ul style="list-style-type: none"> - Just payment system - Reward individualization - Payment flexibility - Reduction of costs
Performance management	<ul style="list-style-type: none"> - Low information - Delays in performance time - Bias - Gender inequality 	<ul style="list-style-type: none"> - Collection of data from different sources - Real time assessment capability - Deletion of psychological bias - Reduction of gender discrimination
Preservation	<ul style="list-style-type: none"> - Lack of appropriate supervision on staff's needs - Payment differences 	<ul style="list-style-type: none"> - The analysis of consumption for staff's services to recognize the needs of the staff - Reduction of differences in payments

There are many tools created based on artificial intelligence that are used to carry out

the processes related to recruitment. In table 2, a number of these tools are introduced briefly.

Table 2: Tools utilized in recruitment processes

Software name	The major function	The technique used
Hirevue	Doing interview for recruitment	Natural Language Processing
Mye	Automated recruitment, interview time appointment, doing interview, assessing the applicants, communication through chat bots	Natural Language Processing and machine learning
Zoho	Resumes' management, finding staffs, communication with different recruitment channels, doing interview	Machine learning and Natural Language Processing
MyInterview	Automatic interview with recruitment applicants	Machine learning
Visume	Finding staffs, assessment and selection of appropriate individuals for the organization and proper to absorb the talented individuals	Robot, Machine learning and Natural Language Processing
Vervoe	Ranking the applicants and comparing them with millions of the data related to other applicants and automated recruitment through assigning algorithms	Machine learning and Natural Language Processing
Hyreo	An assistance for the applicants to communicate with employers through using chat bots	Machine learning and Natural Language Processing
Pymetrics	Behavioral assessment of applicants based on emotions, notices, efforts, fairness, concentration and learning, tool designing based on ethics and fairness in recruitment	Machine learning

5. Discussion and Conclusions

During some recent years, artificial intelligence has been able to get notice of some big and advanced organizations in order to make benefits from this technology. Findings of the present study showed that artificial intelligence has been vastly utilized in human resource management. This technology can be used in processes such as: recruitment, training, salary and wages, performance assessment, prediction, and data based decision making. Artificial intelligence has great capabilities in recruitment and makes the recruitment incumbents to appropriate less time and cost to achieve more appropriate recruitment results. Through the use of this technology a high volume of resumes could be screened and unrelated resumes could be deleted using it and only the staffs with certain qualifications to get employed by the organization are considered to be interviewed. Additionally, using natural language processing techniques and platforms based on artificial intelligence, we can interview the applicants and select the best individuals for the jobs asked along with recognition of the applicants' stress, dominance, and anxieties. Also artificial intelligence is able to communicate with the staff permanently through communication bots and respond their common and repeated questions regarding issues such as how to ask for off days, how to compensate the services, and how to recognize assessment indexes automatically.

It could be predicted that artificial intelligence will be considered more seriously in future by big organizations, specifically those organizations that

propose information technology services and strategies required in human resource management. Also, it could be predicted that in future we will encounter the deletion of jobs such as: secretaries, telephone operators, typists, translators, and secretariat incumbents who have monotonous and repeated works. On the other hand, in future we can observe the creation of jobs such as human resource analyst, intelligence and human resource specialists, and emotion analysts.

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