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# The Impact of Applying Artificial Intelligence on Human Resources Crisis Management: An Analytical Study on COVID19

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**Abstract:** The industrial sector has to be prepared and adaptive to sudden shocks and crises, which can be represented by natural disasters, health or economic crises that create a difficult environment before different human resource managers to find solutions to encounter the immediate threats to corporate performance and ability to survive and grow. With the spread of Corona Virus (COVID 19) pandemic, companies of the industrial sector have to find innovative and creative solutions to face the challenges and transformations resulting in the regions of their operations and their different sectors. In this paper, we discuss the analysis of the effect of applying Artificial Intelligence (AI) to human resources crisis management in the industrial sector with focusing on the effects of COVID-19 crisis on Human Resource Management (HRM). In addition, we suggest a number of recommendations to encounter the consequences of crisis effects and prepare an integrated research agenda to face the discussed challenges.

**Keywords:** Artificial Intelligence – Crisis Management for Human Resources – COVID 19.

## 1 Introduction

The application of artificial intelligence (AI) is one of the most important managerial and technological trends under modern consequences and challenges. The emergence of AI dates back to 1956 in the USA. In the early 1960s, the attention of governments and European industrial sectors increased to financing initiatives and research projects related to this field. However, with the beginning of the current century, there has emerged a boom in AI applications that have relied on technological methods and data, computer science in the field of electronics, educational programs, medical sciences, and so on [1]. Today, in the continuously changing and unstable environment, business organizations have witnessed several local and international crises, which motivated them to pay attention to the adoption of the concept of Crisis Management for Human Resources. This concept highlights the role of HRM that is the strategic partner of organizations and the most valuable asset in planning and management for adopting the philosophies and practices of crisis management. At this point, one of the priorities of organizations has become the direction towards HRM knowledge of crises and their management procedures

for developing crisis management strategies to face global consequences. [2].

In the context of international crises, especially the crisis of Corona Virus (COVID 19) pandemic, which has resulted in radical changes leading to unprecedented effects on business organizations and HRM, the whole world has been directed towards developing innovative solutions and policies for hybrid working systems as a response to current and future crises. In addition, digital technology platforms are used to enable employees to develop their skills and prepare them for responding and adapting to virtual reality and complete closure [3].

The study hypothesized that there is a significant effect of AI dimensions on crisis management for human resources in the Egyptian industrial sector under study.

The research problem focuses on the increasing intensity of the economic, managerial, health, and political crises in different local and international sectors has led the majority of industrial companies to applying AI methods under quick changes in human resources crisis management (COVID-19). Companies of the industrial sector encounter several shortcomings in performance and weakness in knowledge accumulation of the human element. In addition, there is a lack of the prediction of, and preparation for, the crisis, and

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the financial capabilities that are necessary for encountering the challenges of virus spread are weak. In turn, it is necessary to study and analyze these challenges and find practical solutions and suggestions to face them with determining the influence of AI dimensions on crisis management for human resources in the Egyptian industrial sector.

The Importance of Research in the application of AI is one of the modern technological directions in different science at the academic and practical level and it has become an effective tool for crisis management for human resources under the crisis of COVID-19. This topic still requires more studies and deep analysis of its dimensions and it is considered a scientific addition to the Arabic and Foreign Library in this field.

The research is an attempt to cover the role played by AI applications in crisis management for human resources in business organizations, especially since the advent of Corona Virus (COVID-19) crisis. This crisis has forced companies all over the world to use (AI) methods that are based on knowledge and technological systems to be responsive to new and urgent situations and conditions, and to deal with them.

The importance of research stems also from the fact that it deals with the topic of crisis management for human resources (CMHR), which is one of the modern directions in the field of HRM and it is based on analyzing the current situation of radical changes resulting from Corona Virus (COVID-19). In addition, the research develops plans for managing crisis and finding solutions to it, and develops suggestions for its treatment.

In addition to the above-mentioned, the importance of this research stems from studying and analyzing the relationship between AI and CMHR, and conducting an analytical study of crisis management (COVID-19), which is currently one of the important global issues.

This research aims to identify the funerals challenges facing business organizations in Egypt, and determine the additional challenges facing business organizations under the spread of Corona Virus.

It determines the extent to which the industrial sector is affected by the consequences of the spread of Corona Virus pandemic. In addition, the research aims primarily to analyze the effect of applying AI on CHRM by conducting an analytical study of the current situation of companies in the industrial sector. In addition to the above-mentioned, the current research aims to present a number of recommendations that can reduce the crises of human resources, resulting in contributing to developing the performance of the Egyptian industrial sector.

## 2 Literature Review

Artificial Intelligence (AI), The term “Technology” has come to appear for the first time in 1950 by its founders John Von Neumann and Alan Turing through formalizing computers to be a global machine that can carry out what was

translated until the British Scientist “Alan Turing” discovered the mathematical potential of (AI). The term “(AI)” was first presented by John McCarthy and Marvin Minsky who confirmed that the development of computer software required high-level mental processes including cognitive learning, memory organization, and critical thinking. Then, computers would help humans in the tasks they perform. The real attention paid to adopting the idea of (AI) was in 2010 based on big data, expert systems, machine learning, and deep learning through experiences and research of global universities under the technological boom and the challenges of global crises. [4]

Currently, the world witnesses the era of science fiction with the concept of robots with AI. Its applications are based on a set of sciences represented by computer science, mathematics science, and neurology that have strategic importance in several industries of business organizations including technology, banking, and marketing. Therefore, the language of AI is the future as the general purpose is intelligence, i.e. machine that outperforms human cognitive capabilities in various tasks [5]

In light of the above, some concepts of AI and its related terms can be addressed within the limitations and requirements of current research as follows:

Lu, H. et.al define AI as “a set of techniques and tools that serve certain conceptual fields such as intelligent cognition and intelligent learning, support social life, economic activities, and contribute greatly to sustainable development. [6]

Haenlein, M. & Kaplan, A. define (AI) as “a system’s ability to explain external data properly, learn from this data, and use this knowledge to achieve certain objectives and tasks through flexible adaptation. However, in light of Corona Virus (COVID-19) crisis. [7]

the study of Vaishya, R. et. al indicate that (AI) is “a set of intelligent applications relying on big data and machine learning to perform examinations and analyses, and predict and follow-up current and potential patients in the future”. [8]

The study of Naude, W. addressed the importance of AI in encountering the challenges of Corona Virus crisis [9], as indicated by the research of the World Health Organization (WHO). This is done by following up and predicting the spread of Corona Virus using a large database that relies on technological techniques, collecting data and information about patents that support innovations to discover new medications for confronting the virus, and translating scientific research into global solutions.

The study of Chen, L. et al presented the forms and classifications of AI as follows: Machine Learning; is based on developing systems that know or improve performance, simulate human intelligence to make proper decisions and intelligent procedures, and perform analyses based on samples of datasets to discover knowledge. [10]

However, Learning Analytics is a science that is based on

data collection, analysis, measurement, and provides reports on learning a new technique to understand and operationalize the environment where learning takes place. Data Mining is a secondary statistical process that relies on analyzing an amount of data (usually a big amount) to find a logical relationship summarizing data in a new manner that is understood and useful for the data owner.

The study of Glikson, E., Woolley, A. revealed that AI is a new generation of techniques that can interact with the environment and simulate the human element. It has acquired the confidence of individuals in AI technology. [11] The study revealed the important role of tangible AI behaviors, transparency, reliability, and immediacy in developing knowledge confidence, and the role of AI embodiment in emotional confidence in particular.

The study of Nishant, R., et al examined the effect of AI on business practices and industries to tackle societal problems to achieve sustainability. In turn, this supports the appropriate organizational processes to reinforce HR activities culturally and reinforce the environment. The study found that AI has an important role in reinforcing the provision of immediate solutions to reduce threats to environmental sustainability through technological knowledge, dynamic curricula, and machine learning. [12] The study of Mussa, M., who used the quantitative method by collecting questionnaires' data on the internet, revealed the effect of AI on the behaviors of the population under study. The study showed that there is a positive relationship between AI and consumer behavior. [13]

On the other hand, Borges, A. et al reviewed literature on AI tools in solving problems strategically with shedding some light on the potential benefits, challenges, and opportunities of AI. The study revealed the creation of a commercial value that is supporting decisions, engaging employees and customers, information automation, providing new services and products, contributing to developing administrative scientific theories, presenting opportunities for building new theory and new forms of management practices. [14]

In the field of business administration, AI is the starting point for discovering the concepts of automation, which means that machines take charge of human tasks, indicating that business organizations today under technological developments require radical change to use AI to perform tasks at a higher level of excellence and with the required accuracy [15].

By reviewing previous studies, it is possible to conclude the indicators related to AI as follows: data and privacy protection laws, Information and Communication Technologies (ICTs), digital services, the availability of digital skills, entrepreneurship culture, the provision of qualified human resources, technological infrastructure, digital inclusion, the budget allocated to AI.

### 3 Crisis Management for Human Resources (CMHR):

The emergence and spread of Corona Virus (COVID- 19) for the first time in December 2019 in the Chinese city of Wuhan has led it to be a global epidemic due to its severity [16]. As a result, all countries all over the world have referred to it as “the crisis of the century”. Through the rapid spread and development of this pandemic, it is evident that there are several huge challenges forcing business organizations to adopt successful crisis management to maintain their various operations. The availability of effective human capital is the most important tool for reducing crisis exacerbation, reducing its consequences, and accelerating the recovery from any other risks [17]

At this point, it has become necessary to align crisis management with business strategy in business organizations as business organizations have become more affected by the multinational environment with the different, complicated, and changing effects from the technological perspective. Therefore, the issue of crisis management has received much attention from a business perspective since crisis management, as a concept, is a set of practices concerning the development of human resources and has become a part of the approach to the strategy of merging human resource activities and organization's policies. In turn, this highlighted the role of HRM that takes the role of the strategic partner in its responsibilities towards crisis management to reduce the rates of losing available resources. [18]

The study of Su, D. et al confirmed that the crisis of COVID-19 has caused the collapse of the global economy in the sector under study, resulting in forcing companies to commit to the imposed constraints and adopt the procedures of social distance to contain the virus. In turn, this forced companies to close, leading to putting more a hundred million jobs in danger. [19] Based on the estimations of the Organization for Economic Cooperation and Development (OECD) of 2020, it was estimated that the effect of this crisis is five times more than the effect of the global financial crisis of 2008. Twenty managers of companies under study were interviewed in Vietnam during the closure crisis. The study showed that the adoption of human resource practices contributes to reinforcing the organizational flexibility of companies to encounter the global epidemic. The report of the International Monetary Fund (IMF) on the global financial stability in 2020 under the health and humanitarian crises showed the effect of COVID-19 pandemic on the global financial system and procedures taken to contain the crisis. It led to disrupting global markets, reducing liquidity rates, and the occurrence of strong economic downturn, resulting in the political and administrative intervention by world states through directing central banks to provide additional financial liquidity for the financial system, provide credit at an acceptable price, and initiate a set of new programs to

activate various sectors.

This is due to the strategic role of central banks in protecting the stability of global financial markets and reducing risks and shocks to sectors of the global economy with reinforcing the complete recovery in the long run [20]

In light of highlighting the relationship between human resources and crisis management in companies, the study of Drašković, B. & Džunić, M. confirmed that the effective implementation of successful crisis management strategy is one of the most important sources of competitive advantage of business organizations. Current situations of dynamic business environment have imposed the need for accepting changes in a flexible manner whether these changes are sudden or gradual. [21]

Accordingly, it has become evident that it is necessary to understand the crisis and the role of crisis management in preventing crises, managing them, encountering them, and increasing the awareness of crisis management as a necessary element of any business system.

Under different global crises, business organizations have been directed towards reconsidering HRM strategies with developing technological and informational intelligence methods as a basic partner for ensuring survival and sustainability.

Therefore, Hamouche, S. indicated the effect of COVID-19 on the most important jobs and practices of HRM in business organizations such as training, job development, safety and health management, management of recruitment, management of compensations, performance management, and so on. [22]

As a result, this resulted in the direction towards building future orientations and visions particularly to develop work schemes to adapt to requirements and adopt the effective use of human resources to serve corporate strategic needs. Consequently, after the emergence of the crisis, companies have perceived the need for finding effective and creative solutions and technological systems to develop expected scenarios of the future, maintain corporate business, and help employees to encounter sudden transformations and urgent challenges facing industrial sectors and resulting from humanitarian crises.

### Research Analytical Framework

It is shown that (COVID 19) crisis is basically a human problem that caused broad infection for more than 113 million people all over the world, and 2.5 million deaths according to (February 2020), statistics – therefore the whole world countries tend to a tight closure to stop the social reaction, which leads to a lot of human, political and economic crises.

The impact of the present international economic slowing compared with the past financial crises leads to calling all the human resource leaders in order to find and put solutions and suggestion to keep all sectors working – those leaders are the first line to face the challenges to enable the business firms to get out safely from that crisis. [23]

The appearance of (COVID 19) pandemic these days creates many administrative, economic and political unprecedented crises which led to a group of challenges to face the

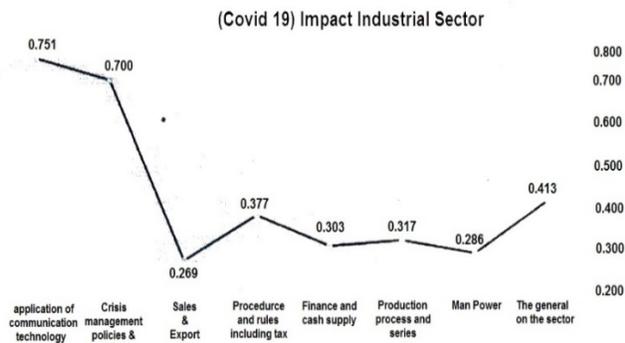
industrial sector in Egypt: (Investment rates declining, out dating of the industrial rules and regulations, downgrading of technological infrastructure levels, floating the Egyptian pound, uprising of energy and electricity prices, ... etc) which negatively affected the sector, (The report of the U.N industrial development with industry innovating center of the ministry of commerce and industry Egypt (Sep 2020)), showed that the indicator that measures (COVID 19) impact on the industrial sector has been decreased a big deal regarding the performance of a huge number of industrial sector firms: Sales export, workers, finance and money turn over, production rates, the ability to pay commitments, production and logistic series.[24].

The indicator has been measured through a survey on 300 industrial firms to show the impact of the crisis on different industrial sectors (Chemical, food, agricultural, engineering, waving and textile, leather, furniture).

Through calculating the possible 7 indicators for the firms belonging to each industrial sector as follows: The main indicator and subordinated indicators are between (0.0) and (1.0), if it shows between (0.0 < 0.5) that means that the performance of the firms has declined due to the crisis compared to their previous performance and if it shows (0.5) that means there is no effect on the industrial sector either positive or negative.

The closer the indicator from (0.0) means declining in the firms performance, meanwhile if the value is between (0.5, 1.0) that means performance progress during the crisis compared to previous one.

We can show the impact of (COVID 19) pandemic on the Egyptian industrial sector through the following Figure.



**Fig.1:** Shows the general measure of the effect of the (COVID 19).

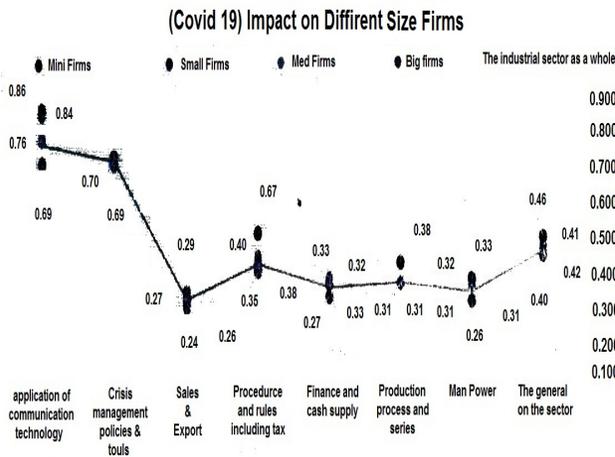
**Source:** Industry sector indicators series and U.N organization for industrial development in Co-operation with industrial innovation centre (Ministry of Commerce and Industry).

on the industrial sector through seven main indicators: (Man power, productive processes, and logistic supplies, finance and cash providing legislative and regulations including taxes, local sales and exporting, crisis policies and tools management, applications of communication technology), It has been found that the indicator of (COVID 19) impact on

the industrial sector came to (0.413), which is negative on the whole industrial sector.

The most effected part by that crisis was the local sales and exporting (0.269) which was the cause the down value of the currency, decreasing the man power, whereas the least damaged: Part was the communication on technology (0.751).

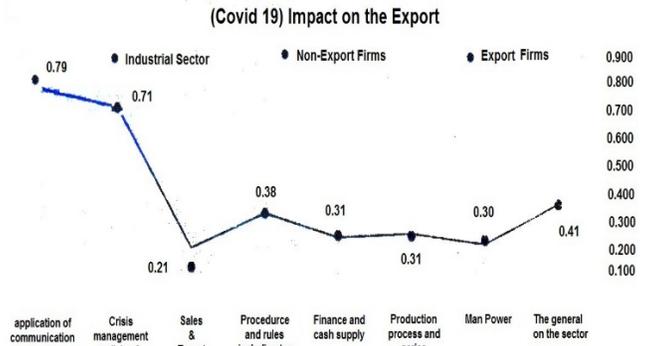
We can also show the impact of (COVID 19) on the firms of different sizes which was extremely negative in all of the operating, selling, and financial aspect as in figure (2) shows (COVID 19) Impact on Different Size Firms



**Fig.2:** shows (COVID 19) Impact on Different Size Firms. **Source:** Industrial sector indicators series, U.N Organization for Industrial Development Center (Ministry of Commerce Industry), 1st edition, (2020) August.

From the figure: Different industrial sector firms have enforced the policies and measures of crisis management through adapting communication technology, however, it was found that the big firms have been affected seriously regarding sales and exporting (0.24), meanwhile the small firms have been greatly affected regarding finance and cash (0.33).

While the impact of this pandemic on the exporting and non-exporting firms – shows that most of the firms faced large size decrease in sales compared with the performance range of industrial sector sales as whole and that showed in figure (3) (COVID 19) Impact on the Export & Non-Export Firms.



**Fig.3:** (COVID 19) Impact on the Export & Non-Export Firms. **Source:** Industrial sector indicators series (2020), U.N Organization for Industrial Development Center (Ministry of Commerce Industry), 1st edition, August.

Despite the application of all the crisis management policies and measures by all the firms that supply the local markets and the exporting firms, the exporting greatly surpassed on applying communication technology to complete the business. As showed in the following table (1)

**Table 1:** The Impact of (COVID 19) pandemic on different sectors.

Series	Sort of Sector	Impact Percentage	Sort of Impact (positive/Negative)
1	Chemical Industries	- 18.8%	Negative
2	Food Industries	- 22.8%	Negative
3	Engineering Industries	- 21.3%	Negative
4	Textile Industries	- 26.1%	Negative
5	Leather Industries	- 27.2%	Negative
6	Furniture Industries	- 28%	Negative
7	Other Industries	- 17.3%	Negative
General Impact		- 25.4%	Negative

**Source:** Industrial sector indicators series, U.N Organization for Industrial Development Center (Ministry of Commerce Industry), 1st edition, (2020) August.

The same source thus (COVID 19) has negatively affected all industrial sectors as the general impact (-25.4%), it also showed that the most negatively affected sector is furniture sector (-28%), followed by leather industries (-27.2%) then textiles (-26.1%).

From above: We could illustrate the impact of the pandemic on the industrial sector as follows:

- 1- Man power indicator went down in most industrial firms at (0.29) as a result of the special rules and regulations that organize working operations approved by the state as well as the decrease of the indicator of production process and logistic supplies at (0.32) due to the partial and total closure in some firm according to the applying measures and policies.
- 2- There is a retreat in finance and cash indicator at (0.30) because of the going down of investment rates that are necessary to finance the production processes of the firms, then is also a decrease in legislative and measures indicators at (0.38) because most firms faced many crisis including tax-insurance and other spending (electricity, Gas, water bills).
- 3- There is also a great retreat in the sales and export indicators at (0.27) due to sales decrease in the local and international markets, and the uprising of cost (shopping, importing raw material) and less exporting agents or markets, meanwhile there is a great improving in the crisis management policies and tools inside most firms at (0.70) as a result of applying the cautious measures in these firms.
- 4- There is a positive improvement on the communication technology applications indicator at (0.75), as most firms have invested in technological systems to reach the clients improving the business administrate increasing working efficiency inside the firms and minimize the virus infection rates.
- 5- The big firms are generally the most beneficial from the state measures to face the pandemic effect as: decreasing the prices of electricity and Gas postponing the due payments and the real state tax.
- 6- Regarding this study, the impact (COVID 19) pandemic on the whole world countries led to regional competition, political instability, the spread of the pandemic affected the political situations inside the economics of North Africa and the Middle East area, which enforce taking a comprehensive reform Agenda to handle the basic structure issues such as decentralization, private sector development, supporting the growth such as spending more on health and education, economic variation and depending on industrial creation as a call for a world continuous development. [25]
- 7- The closure processes and the cautious measures due (COVID 19) pandemic led to slowing down

the industrial sector in Egypt due to the decrease of the local and international demand.

## 4 Conclusion

Within the framework of the theoretical study and in light of the results of the analytical study of the current situation of the Egyptian industrial sector,

the general results of the study and the proposed recommendations can be identified as follows:

It is showed that there is a negative effect of the pandemic on the industrial sector firms regarding decreasing production, investments, and profit which led to raise in the unemployment rates.

The Egyptian industrial sector faced a group of shocks and consequences: (Human, economic and political) such as instability in the international markets, minimizing cash rates, strong economic depression, out dating of industrial sector regulations and measures absence of technological infra- structure supporting investment.

Artificial intelligence which one of the most effective regarding facing human crises management exposes to some shortcomings in applying its style on the given industrial sector: Weakness in the numbers of trained and qualified human resource, weakness in tending towards enforcing technological research, absence of suitable finance for development.

The most effective consequences of (COVID 19) on the world economics are: Uprising of poverty rates, short in production necessities imported from abroad, uprising prices of the raw material needed for some industries such as medical industries, decreasing the industrial commercial exchange between countries.

Despite of the consequences of the pandemic crisis, there are some positive aspects: The use of information technology and communication to run the firm's business and keeping their clients a long with applying cautious measures to stop spreading the virus and trying to eliminate it.

There are negative effects of (COVID 19) pandemic on the industrial sector which led to decrease the Egyptian economic growth rate into (6.3%) in (2020) compared with (6.5%) in the previous year, but the Egyptians economy is still the only of the emerging economies that achieve positive growth rate.

The authors have recommended a group of points as following:

Reconstructing and developing the industrial sector and preparing a group of economic motivating facilities to lighten the negative impacts of the crisis, and refreshing industrial activities, in the short run to overcome the crisis.

Create an insurance fund to serve the occasional human resource during crisis time, especially for industrial sector, as well as taking to the technological level care, developing wage rates, enhancing the electronic health services to offer on line health consultation according to general safety measures and to ensure social distancing measures.

Directing the relevant state agencies efforts to promote and

attract local and international investments to manufacture the imported raw material needed for solving the industrial supply series, and giving technical support programs to facilitate the relations and contracts of the logistic and supplies among industrial firm through electronic communicating systems, so that all the data and information needed for industrial activities could be available and working on supporting the payment balance by trying positively developing the local currency price and minimizing the gap between import and export.

Enhancing cooperation in the field of digital transformation developing the informational and technological environment for all industrial areas, and providing a hot line to answer the queries of the factories regarding precautionary measures and providing various services for industrial sector such as mobile clinics for continuous examination on workers and providing antiseptics and precautionary tools inside the area. providing support and protection for medium and small projects through the central bank support to the finance initiatives for these projects and taking the necessary steps to postpone payment or loan scheduling at low interest rates and pay all the export subsidy dues as well as accelerating payment procedures and down grade the tax dues on the industrial sector in the crisis time.

To make sure of applying the policy of preferring local products in the governmental purchases and the national projects in the order to increase the local sales to the local and national firms with the intensification of the Egyptian offices to promote products in emerging markets.

Based on the review of those comprehensive literature, this search innovatively presented a conceptual framework and explained the impact factors of applying the artificial intelligence styles on human resources crises management, as for (COVID 19), and the modern technological factors and the consequences of globalization and competitive challenges, the business firms and different sectors are greatly exposed to sudden external shocks which are unpredictable.

Which cannot be faced in a simple way through quick reforms to ensure full solutions on the sectoral, organizational and human level, however, it needs deep learning and thinking to face the crisis on studied scientific applied foundations, so we must prepare qualified human resource to work on applying artificial intelligence Styles for crises management.

Thus the demand for developing this kind of human resource that use the technological styles starts to raise, in conclusion, this study believes that using ability for Artificial Intelligence applications for human resource crises management may have a great impact on surviving and growth on the long and short run and that should be taken as one of important parts in human resource crises management initiatives.

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