

The effect of implementing artificial intelligence on job performance in commercial banks of Jordan

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CHRONICLE

Article history:

Received: December 14, 2020

Received in revised format:

January 29 2021

Accepted: March 2, 2021

Available online:

March 2, 2021

Keywords:

Artificial Intelligence

Job Performance

Commercial Banks of Jordan

ABSTRACT

This study aimed to clarify the effect of artificial intelligence with its variables (ES, NN, GA, and IA) on job performance. The banking sector in Jordan is used as a study community and targeted managers at all levels, and in order to achieve the objectives of the study, a questionnaire is developed for the purpose of collecting data from the random sample. The sample consisted of (319) managers. Also, the study used the descriptive approach and the data are analyzed on SPSS. The results showed that there is a statistically significant effect of artificial intelligence that affects job performance through (GA, and IA) only. In addition, the results showed that gender, academic qualification and years of experience have a statistically significant effect on job performance in commercial banks in Jordan. The study recommends preparing future research for the same variables and the study community, but for another country, in order to generalize the results.

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1. Introduction

The study problem focuses on the fact that most of the employees in the banking sector need continuous improvement and development to reach the strategic objectives of the organization, and thus for organizations to obtain competent employees is extremely difficult due to the scarcity of the competent human element. Therefore, organizations resort to expert systems, artificial intelligence systems and smart agents in order to raise the efficiency and effectiveness of employees. Also, they improve their performance to reach the desired goals. So, in light of the above, the study problem can be formulated in the following questions:

- What is the extent of contributing to the expert systems, neural networks, genetic algorithms, and intelligent agents in improving the employees' job performance in commercial banks of Jordan?
- Is there a correlation to the effect of artificial intelligence with its variables (neural networks, genetic algorithms, and intelligent agents) in improving employees' job performance?
- Does job performance among the employees in the banking sector differ by (gender - educational qualification - years of experience)?

The goals of this study are trying to reach are: 1- Identifying the obstacles facing the artificial intelligence implementation in commercial banks of Jordan. 2- Clarifying the concept of artificial intelligence and job performance, its management systems and its various models for both higher management and workers in order to be adopted. 3- Achieving the correlation between the theoretical and academic concepts that were put forward and the possibility of applying them in the field. 4- Determine the level of impact between the two variables of the study. 5- Defining the management that the one of the fundamental reasons for the development of the banking sector is concern for both issues.

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2. Literature Review

The one of the oldest challenges facing humanity is the urgent need to find solutions that can simplify life. After changing hard physical labor to automatic machines, society thought of creating machines capable of performing (mental) work, which for a long time had been a purely human privilege (Bikeev et al., 2019). Artificial intelligence (AI) may replace human capital in performing some tasks, such as adaptive tasks and contextual and organizational performance, which are already tasks that humans are increasingly replacing with artificial intelligence. At the same time, other tasks not shown historically as tasks are transformed for several parts of the HR workflow, so that they can be performed using AI tools (Agrawal et al., 2019a, 2019b).

So, AI technologies have already begun to effect on the human resources and job performance in an organization, by building detailed monitoring, training and development plans for each employee performance based on background processes that rely on big data or data analytics related to employee practices in real time (Alhashmi et al., 2019). And with the emergence of new technologies, the organizations are already starting to see creative use cases of artificial intelligence in ways that can bring more positive benefits to workflows, according to a review by Infor, a leader in the supply of applications for industry-specific and cloud-based companies, the impact of artificial intelligence technologies. On the performance of employees in job performance departments (Acemoglu & Pascual, 2019).

Only five years ago, the examples mentioned above were probably pure fiction. However, with the advent of innovative text analysis algorithms and pioneering classification methodologies in the fields of machine learning, as well as the maturity of big data analytics, AI technologies are poised to revolutionize in an organization's with unimaginable ways (Sayidy, 2018).

2.1 Artificial Intelligence (AI)

The successive developments in computer science and its software during the last twenty years have been of great speed, outperforming other developments in other sciences. One of the great and recent developments in software is the so-called AI, which is one of the modern technologies.

AI techniques have made a great revolution in the field of information technology, as AI is a subfield of computer science, and it includes the creation of smart devices and programs that work and interact like humans (Kamble and Shah, 2018); it is "a name commonly used to refer to the field of science that aims to provide students with the ability to perform functions such as reasoning, planning, learning and perception." AI is designed to raise the capabilities of workers, not replace them, as it makes connections between complex applications and between workers, computers, knowledge, and the physical world. Among its capabilities are to enable applications during their work to distribute and retrieve data, data mining, product design, manufacturing, and scheduling, and that AI systems depend on human experiences and knowledge and choose logical models, and that the current systems are an extension of human experiences, but they do not replace them because they lack human feeling (Shaw et al., 2019).

AI is computer science that is concerned with creating and studying computer systems that display a form of intelligence, in other words, it is "systems that learn new concepts and tasks, can think and draw conclusions". That requires human intelligence, and AI means studying the ideas that will form machines capable of simulation in line with traditional human responses, by looking at the human capacity for intention, thinking and conclusion (Shukla & Vijay, 2013).

Tuomi (2018) defines AI as "a machine that understands and interprets sounds and languages, works to solve problems, can diagnose medical cases, control cars on the roads, plays games like chess, and imitate impressionistic images from Van Gogh paintings". By definition, artificial intelligence is "a system that has the ability to perform tasks normally associated with living organisms". Also, Shi (2019) defines it as "that field of study that depicts elementary learning skill just like humans, and examines the ability to respond to certain behaviors also known as AI".

The rapid advancement in AI and automation technologies has the potential to wreak havoc on labor markets. While AI and automation can increase the productivity of some workers, they can replace the work done by others and potentially transform nearly all occupations at least to some extent (Frank et al., 2019).

So, the importance of AI lies in its use of a method similar to the human method in solving complex problems, characterized by synchronization, accuracy and high speed in receiving and addressing hypotheses, and the ability to find a solution to each problem, as well as the ability to process non-digital data of a symbolic nature. According to Simin et al. (2013) "It is also difficult to prepare, as it requires the representation of huge amounts of knowledge in specific fields, and among its objectives is to simulate a person in his way of thinking, behavior or response, and to create new, creative and innovative ideas".

Independence and prediction: that is the ability of artificial intelligence to act independently. AI systems are able to perform complex tasks, such as driving a car and building an investment portfolio, without effective human control or even supervision. There are great possibilities about the economic challenges and disruptions of the labor market caused by applications of AI, and how these applications are likely to take effect in the way forward (Aljaber, 2020)

One of the importance of AI is monitoring. The risks that arise from the independence of AI include not only predictability problems, but also control problems. It may be difficult for humans to maintain control over the firsts that are programmed to work with a great deal of autonomy. There are many problems. That occurs as a priority causing loss of control: a malfunction, such as a damaged coil or physical damage to the input equipment; Security breach; Here, the large response from these

applications appears with a superior response time compared to humans. If AI is designed with a feature, it will enable it to learn and adapt. It is these characteristics that make AI a potential source of public risk on a scale far beyond the familiar forms of public risk that arise solely from human behavior (Scherer, 2016).

2.2 AI Dimensions

Experience Systems (ES): ES are considered one of the applications of AI programs, as the family refers to a variety of current and new applications in different global and theoretical fields, and therefore the nature of this family is open and receives new members and innovations associated with previously unknown uses of artificial intelligence technology, in particular technologies integrated with information systems in the organization.

ES are "techniques that discover solutions to problems that require specialized knowledge and skill, and the system operates in them by the expert's thinking, skills and motivations in order to simulate them." So, ES techniques are different types of AI methods, in which the parameters of functionality are recorded (Mazaryazdi et al., 2010). It is possible to develop an ES program for any problem that involves choosing from a specific set of options, as functionality depends on logical steps. Hence, any area in which Person A or Group possesses special expertise that others need is a potential area of ES (Chukwudi et al., 2018). Also, ES can use their knowledge base to make decisions and accomplish tasks in a way that meets the user's goal (Frank et al., 2019).

Neural Networks (NN): Also called artificial neural networks, it attempts to mimic the human brain actions. NN are a system of devices or programs that are designed in the shape of neurons in the human brain, and it is a variety of deep learning technology, which falls under the family of intelligence Artificial.

NN is defined by some researchers who believe that it depends in their work on a simple view of the nerves, as the nerves are arranged in levels forming a large network, and the network's function is determined by both learning and communication (Kenji, 2013). In the same context, others see it as a process of processing information in a manner similar to the human nervous system, and the main thing is the different structuring of the information processing system by processing large amounts of unconnected information to solve special problems. Thus, the neurons will change the strength of the interconnections between the elements of the processes in response to changing patterns in the received data and the results achieved (Yaris & Ahmad, 2014).

NN have the property of learning and deriving meanings from complex data and developing complex models and trends that are difficult to observe, whether by humans or ordinary computers. They provide us with multiple projects by giving answers to questions (Shaw et al., 2019), in addition to commercial applications of these technologies generally focus on Solve complex signal processing problems or recognize patterns in job performance, examples of significant commercial applications since 2000 are handwriting recognition for check processing, speech-to-text transcription, oil exploration data analysis, weather forecasting, and facial pattern recognition (Atom, 2019).

Genetic Algorithms (GA): An algorithm is the set of instructions that are repeated to solve a problem. The word genetic refers to the behavior of algorithms that can resemble biological processes. It is also inspired by Darwin's theory of natural selection to solve optimization problems, especially with incomplete or incomplete information, or even limited computational ability (Kumar, 2018).

O'Brien (2000) defines GA as solving methods that help create solutions to specific problems using methods compatible with their environment. According to Ajam (2018) GA are programmed to work in the way humans solve problems by changing and reorganizing component parts using methods such as reproduction, transformation, and natural selection, thus providing us with methods to search for all possible combinations of numbers to identify the correct non-numeric variables that represent the best possible structure for a problem, which are useful in situations where thousands of solutions are possible and must be evaluated to produce an optimal solution.

GA is a growing application of AI that are used in mathematical applications to simulate advanced procedures that produce better solutions to the problem. Therefore, they are used in various sciences, technologies, and business processes. It is also a system that tries to find the mix of inputs that give the best results, and is suitable for making decisions in environments with hundreds of solutions. The potential that he finds and evaluates with multiple capabilities is faster than a human (Baltzan & Phillips, 2008).

Intelligences Agents (IA): an IA is an object that can perceive the environment in which it is present through the sensors that this object possesses and then respond to it by means of the actuator or prey mechanisms. Figure 1 shows the relationship of the agent to his environment. It is a knowledge-based ES implanted within information systems that are dependent on the computer or its components to make it smarter, also it is an end-user program or method for carrying out events (Petropoulos, 2018). IA is the knowledge base stored in it about a specific person or process to make decisions and accomplish tasks in a way that achieves the user's goals. Also, AI is anything that observes its environment through sensors and actuators by responding to the environment, and is therefore a design with a program.

And Shaw et al. (2019) remind that it is software applications that help in keeping the company's Internet tasks related to buying and selling, and it warns users when something important happens. Today, there are many IA applications in operating systems such as software applications, email systems, and cell phone programs. Microsoft Office programs contain programs

that help the user in creating files, drawing diagrams, and assistance when needed, such as a wizard, including the journey within the Internet to search for data and information.

2.3 Effect of Artificial Intelligence

Aljaber (2020) aimed to identify the impact of artificial intelligence on the efficiency of accounting systems in Jordanian banks, about population of the (16) banks, with the random sample included (129) questionnaires are analyzed by subject to statistical analysis, the results showed the presence of the effect of using artificial intelligence on the efficiency of accounting systems in Jordanian banks. The study reached several recommendations, including the need to enhance the use of artificial intelligence in the bank to raise the bank's efficiency, and that the management of Jordanian banks should assist expert systems in acquiring knowledge from the knowledge bases stored in the systems in many areas that support the capabilities of the higher management.

Frank et al. (2019) aimed to discuss barriers that prevent scientists from measuring the impacts of AI and automation on the future of work. These barriers include a lack of high-quality data about the nature of work (the dynamic requirements of professions), for the key processes at the micro level (skill substitution and human-machine integration), and an insufficient understanding of how cognitive technologies interact. With broader economic dynamics and institutional mechanisms (such as urban migration, international trade policy). Overcoming these barriers will require improvements in the temporal and spatial accuracy of the data, as well as improvements in data related to workplace skills. These improvements will enable the study to quantitatively monitor and predict the complex evolution of work alongside technological advances. Finally, given the underlying uncertainties in predicting technological change, this paper recommends the development of a decision framework that focuses on resilience in the face of unforeseen scenarios as well as overall equilibrium performance.

Ajam (2018) aimed to find out artificial intelligence and its impact on high-performance organizations. The Ministry of Science and Technology was the population chosen to conduct the study and distribute the questionnaire, where (40) questionnaires. After analyzing the data, the results show that there is an effect of artificial intelligence on the work of the ministry. also presented a set of recommendations, the most important of which was the need to expand the applications of artificial intelligence According to the needs of the departments for each type of artificial intelligence in order to advance the reality of the ministry to a better level.

2.4 The Job Performance

Job performance represents a special place within any organization that is considered the final product of the outcome of all activities in it at the level of the individual, the organization and the state, so that the organization is more stable and longer lasting where the performance of employees is distinguished performance and that the attention of the organization's management and its leadership is usually in the level of performance. It exceeds the interest of workers in it.

There have been many definitions of the concept of job performance as it refers to the degree of achievement and completion of the tasks that make up the job of the individual, and it reflects how the individual achieves or satisfies the requirements of the job, and often there is confusion and overlap between performance and effort, as effort refers to the energy expended, while performance is measured on the basis of the results are achieved by the individual (Pradhan & Jena, 2017).

The performance is what the employees do in their work according to the goals of the organization, it is a measurable (observable) behavior. They are also physical, activities and psychological activities, such as cognitive processes and problem solving (Ramdani et al., 2019). In addition, the researchers also emphasize that job performance is a behavior rather than outcomes, and the behavior is consistent with organizational goals and is multidimensional. And that there are three components of performance, understanding and knowledge of work tasks, knowledge, skills and abilities and more specific knowledge about the procedures for performing the tasks, and the third is motivation (Koopmans et al., 2012).

Given that the concept of performance overlaps with some other concepts, that will try to draw the boundaries of these concepts, so that it can distinguish. One of these concepts is effectiveness, efficiency and productivity through these previous definitions that job performance represents the means by which the individual satisfies the requirements of the job he performs.

- Performance is the summary of the employee's accomplishment of his assigned tasks. 2- It is the process of converting all incentives, experiences, competence and awareness into outputs, which is the completion of tasks without errors and with the required quality. 3- It is the result of the interaction between motivation + effort + experience + competence. 4- It can be said that it is a behavior directed towards achieving the goals of the organization (Muda et al., 2014).

Hence, the definition of job performance can be deduced as the employees' implementation of the tasks and duties required to achieve the goals and responsibilities of the organization in accordance with the provisions of the laws and organizational decrees, which are specified for each job and its duties, and which are finally achieved by integrating them and by grouping together the objectives of the organization, and this is done effectively and efficiently. And taking into account the time in the completion of the job.

Accordingly, it can be said that job performance is of great importance to the organizations because any organizational level within the organization and in any part of it is not a reflection of the capabilities and motivations of heads and leaders, and

the importance of job performance from the organization's point of view is due to its connection to its life cycle in its various stages of dissolution, namely: the stage of survival and continuity, a stage Stability, the stage of reputation and pride, the stage of distinction, then the stage of leadership, and then the ability of the organization to skip a stage of growth and enter a more advanced stage depends on its levels of functional performance (Farhi, 2017).

Kharshi (2019) emphasized in his study on the effectiveness of the job performance of human resources management and its role in achieving distinguished performance on the importance of the organization's job performance, as that has effectiveness in achieving the goals set by the organization, regardless of the costs entailed by these goals. The efficiency of the organization through the optimum utilization of available resources at the lowest cost, which is the ratio between outputs and inputs, and also between the results obtained and the means used. That is "a relative relationship between the elements of production used to generate a certain amount of production (goods and services), and the value of production according to a specific monetary or physical scale".

2.5 Job Performance (JP)

The job performance in organization, that has basic elements or components through which the organization can measure and determine the level of employee performance, which are according to (Farhi, 2017; Kharshi, 2019):

The employee and his competencies: They are what the employee has in terms of knowledge, skills, interests, values, trends and motives, while his competencies mean what the employee has in terms of information, skills, trends and values that represent the basic characteristics which produce an effective performance by that employee, in addition to dedication. And seriousness in work and the ability to assume responsibilities and complete work on time and the extent of the need for supervision and direction.

Work and its requirements: that include the tasks, responsibilities, roles, skills and experiences required by the job and its requirements and challenges. It also includes accuracy, order, mastery, ingenuity, technical mastery, ability to organize and implement work, speed of achievement and freedom from errors.

The organizational environment and its components: that consists of internal and external factors. The internal factors that affect the performance and include the organization, its structure, objectives, resource, strategic position and the procedures used. As for the external factors that form the environment of organization that affect effective performance, they are the economic, social, technological, and cultural factors, Political and legal.

Knowledge of job requirements: that includes general knowledge, technical skills, and professional background about the job and related fields.

Quality of work: It is represented in the extent to which the individual is aware of the work he is doing, the desire, skills, ingenuity and ability to organize and implement the work without falling into risks.

The Number of tasks is completed: that an employee can accomplish in normal work conditions, and the amount of speed of this achievement.

2.6 Effect of Job Performance

Ramdani et al. (2019) aimed to get an individual work performance scale of the modified version which is more acceptable and has a good psychometric property. The participants in this study were campus faculty who were selected using targeted sampling techniques. The samples participating in this study were 303 participants. The Individual Work Performance Scale has a comprehensive methodology and good psychometric properties. A descriptive approach was used to analyze the data. The revised version of the Individual Work Performance Scale (IWP) has good psychometric strength seen by its high reliability coefficient, the fit model of the structure it builds, and the validity standards in terms of structure and exterior. Therefore, it is highly recommended that the revised version of the IWP be used in the evaluation and evaluation of an employee's work performance in general, and especially in an academic environment.

Kharshi (2019) aimed to find out the contribution of the effectiveness of job performance in achieving the distinguished performance of individuals, the human resource department of sports institutions, this field study was applied in the Directorate of Youth and Sports in the Wilayat of M'sila. Where the study sample consisted of 30 employees from the Directorate of Youth and Sports in the Wilayat of M'sila. The study reached several results, the most important of which is that having individual capabilities has a role in achieving the distinguished performance of individuals for managing the human resources of the sports institution. The study recommended working on developing a job performance evaluation system to contribute effectively to the process of administrative development and development by developing the criteria for the job performance evaluation system, as these criteria focus on aspects related to job performance levels.

3. Research Method

3.1 The Study Design

The study used the descriptive and analytical approach due to its compatibility with the nature of the current research. That population consisted of managers working in Jordanian commercial banks in Amman that are 16 banks, with the sample is

(319) managers. Fig. 1 shows the distribution of the sample members according to personal variables.

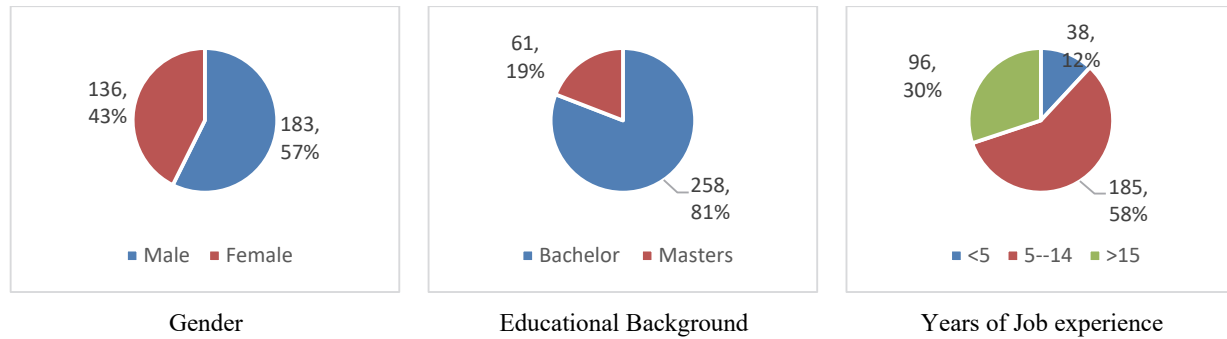


Fig. 1. Distribution of the sample members as the gender variable

Fig. 1 shows the characteristics of the study sample that is depending on the **gender variable**, males are the most frequent, which reached (183), at a percentage (57.4%), while females are the least frequent, which reached (136) and with a percentage (42.6%). Depending on the level of **academic qualification variable**, the employees who hold a bachelor’s degree are the most frequent, which reached (258) with a percentage (80.9%), while employees with a master’s degree are the least frequent, which reached (61) and with a percentage (19.1%). Depending on **Years of Experience** variable, the employees who have (10-15 years) experience are the most frequent, which reached (185) percentage (58%), while the employees who have (5 years or less) experience are the least frequent, which reached (38) by a percentage (11.9%). To analyze the data and answer the study questions, the five-point Likert scale is relied on to answer the questions according to the degree shown in Table 1., that is to interpret the arithmetic means of the respondents’ responses in each statement of the questionnaire and each of study areas.

Table 1
Likert scale

Degree	1	2	3	4	5
Approval level	Agree	Strongly Agree	Neutral	Not Agree	Strongly Disagree

As for the levels of approval degree, which this study adopted when commenting on the arithmetic mean of the variables included in the study form. They are three levels (high, moderate, low) based on the following equation: Length of the period = (the highest for the alternative - the lowest for the alternative) / of levels, $(1-5) / 3 = 4/3 = 1.33$, so the levels are as follows (Sekaran, 2011). Approval rating a low from -1 to less than 2.33. a moderate approval score of 2.33 - less than 3.66. and the approval score is a high from 3.66-5. In addition, the statistical methods are used in analyzing the collected data, within the (SPSS v.23) program to describe the characteristics of the respondents by using frequencies and percentages, and a group of inferential statistics methods are used to answer the study questions, namely - the Cronbach Alpha equation, arithmetic means and standard deviations.

3.2 The Study Variables

The study includes two variables, the first is the independent variable of (AI) which includes four independent sub-variables are (ES), (NN), (GA), and (IA). The second is the dependent variable, which is job performance (JP) (Ajam, 2018; Bikeev et al., 2019; Alhashmi et al., 2019). Fig. 2 depicts the conceptual model of this research.

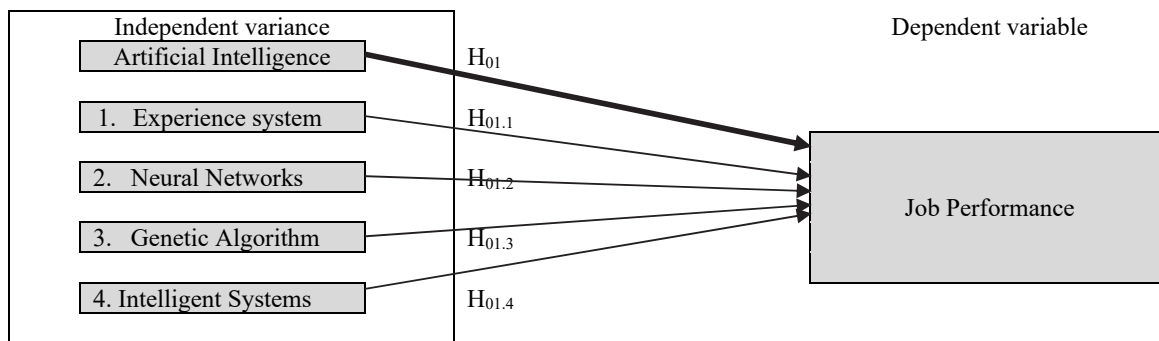


Fig. 2. The proposed study

According to the research model, the one main hypothesis and four sub hypotheses have been formulated as the following:

- **H01:** There is a statistically significant effect of **AI** on job performance in commercial banks of Jordan.
- **H01.1:** There is a statistically effect of **ES** on job performance in commercial banks of Jordan.
- **H01.2:** There is a statistically effect of **NN** on job performance in commercial banks of Jordan.
- **H01.3:** There is a statistically effect of **GA** on job performance in commercial banks of Jordan.
- **H01.4:** There is a statistically significant effect of **IA** on job performance in commercial banks of Jordan.

3.3 The Study Tool

After reviewing previous studies and theoretical literature, a questionnaire was developed to measure the effect of artificial intelligence on job performance of the individuals of the research sample. The research tool consisted of two areas: the first: Artificial Intelligence, and it consisted of (16) statements, divided into four sub-dimensions. In order to ensure the stability of the study tool, the tool stability equation (Cronbach Alpha) is applied for all fields of study, see Table 2.

Table 2
Cronbach's alpha coefficients for the fields of study

No.	The Field of Study	Number of statements	Cronbach's alpha
1.	ES	4	0.67
2.	NN	4	0.74
3.	GA	4	0.69
4.	IA	4	0.71
5.	JP	8	0.80
Total		24	0.86

Table 2 shows the Cronbach alpha coefficients for the study fields ranged between (0.67-0.80), the highest is in the field of "job performance", and the lowest is in the field of "Experience systems (ES)", and the Cronbach alpha coefficient for the questionnaire as a whole reached (0.86). And all the stability coefficients are high and acceptable for the purposes of the study, where the stability coefficient (Cronbach Alpha) is acceptable if it exceeds (0.60).

4. The Research Results

This part includes a detailed presentation of the statistical analysis for the study' results, which aims to identify the effect of artificial intelligence on the job performance in commercial banks of Jordan, as well as depending on the study questions.

Results related of answering the first and second question: The arithmetic means and standard deviations of the questionnaire axes are calculated (ES), (NN), (GA), and (IA). Then, the main hypothesis of the study and the sub hypotheses are analyzed to find out the extent which these dimensions contribute to improving the job performance between the workers in commercial banks of Jordan, as follows:

First: The arithmetic means and standard deviations for the questionnaire axes.

Table 3
The arithmetic means and standard deviations of the questionnaire axes

No.	Statement	Arithmetic means	Standard deviations	Rank	Level of importance
1	ES	3.92	.29	1	High
4	IA	3.86	.35	2	High
5	JP	3.84	.45	3	High
3	GA	3.83	.29	4	High
2	NN	1.92	.24	5	Low
Total		3.47	.22		Moderate

Table 4. shows the arithmetic means of the questionnaire axes as a whole was (3.47) and a standard deviation (0.22) with a moderate level of importance, as the arithmetic means ranged between (1.92 - 3.92). Whereas, the ES are the first rank with an arithmetic mean (3.92) and a high level, the IA are the second rank with an arithmetic mean (3.86) and a high level, in the third rank is JP with an arithmetic mean (3.84) and a high level, also the GA are fourth rank with an arithmetic mean (3.83) and a high level, and the fifth and last rank is NN with an arithmetic mean (1.92) and a low level of importance.

Second: Analysis of study hypotheses.: Main hypothesis: To find out the effect of artificial intelligence with its variables on job performance in commercial banks of Jordan, multiple regression analysis is used, see Table 4.

The results of the statistical analysis in Table 4 shows a statistically significant effect of artificial intelligence with its variables on job performance in commercial banks of Jordan, as the correlation coefficient is R (0.796) at a significance level ($\alpha \leq 0.05$). As for the determination coefficient, R^2 , reached (0.634), meaning that AI with its variables explains 63.4% of the changes in job performance in commercial banks of Jordan. This confirms the correct of the null hypothesis which is: "**H01:** There is a statistically significant effect of **AI** on job performance in commercial banks of Jordan".

Table 4

Multiple regression analysis to find out the effect of artificial intelligence on job performance in commercial banks of Jordan

Independent variable	Coefficient β	T	Sig.*t	R	R ²	F	F Sig*	Constant Coefficient
ES	0.012	0.311	0.756					
NN	0.012	0.308	0.758	0.796	0.634	7.135	.000	-1.75
GA	0.289	7.08	0.000					
IA	0.769	21.14	0.000					

In addition, Table 4 shows the results of the statistical analysis of the sub-hypotheses as a follow: **The first sub-hypothesis:** There is no statistical effect of **ES** on job performance in commercial banks of Jordan, as the T value reached (0.311) and statistically significant (0.756), which is no significant at the level of significance ($\alpha \leq 0.05$). While, **the second sub-hypothesis:** There is no statistical effect of **NN** on job performance in commercial banks of Jordan, as the T value reached (0.308) and statistically significant (0.758), which is not significant at the level of significance ($\alpha \leq 0.05$).

The third sub-hypothesis: There is a statistical effect of **GA** on job performance in commercial banks of Jordan, and the significance of this effect is confirmed by the T value is (7.08) and in statistical significance (0.00), which is a function at the level of significance ($\alpha \leq 0.05$). β (0.289), this means that an increase of one degree in the level of genetic algorithms leads to an increase in the level of job performance in commercial banks of Jordan with a value of (0.289). And **the fourth sub-hypothesis:** There is a statistical effect of **IA** on job performance in commercial banks of Jordan, and the significance of this effect is confirmed by the value of T (21.14) and in statistical significance (0.00), which is a function of the level of significance ($\alpha \leq 0.05$). β (0.769), and this means that an increase of one degree in the level of intelligent agents (IA) leads to an increase in the level of job performance in commercial banks of Jordan with a value of (0.769).

The results of answering the third question: The arithmetic means and standard deviations of the competence of workers in the banking sector were calculated according to the variables of gender, academic qualification and years of experience, and the application of a T-test for independent samples and a test of variance analysis "F" to determine the differences between the arithmetic means. See Table 5.

Table 5

A t-test of samples and a single-test analysis

Variables	Category	Frequency	Arithmetic means	Standard deviations	T. test	
Gender	Male	183	3.54	.18	T= 7.05	.000
	Female	136	3.38	.23		
Academic Qualification	Diploma	0			T= -2.61	.009
	Bachelor	258	3.46	.23		
	M.A.	61	3.54	.17		
	PhD	0				
Years of Experience	5 years or less	38	3.43	.27	F=25.85	.000
	From 10 to 15 years	185	3.42	.20		
	From 16 to 20 years	96	3.60	.17		

Table 5 shows a t-test for independent samples and a single-test analysis of variance to find differences in job performance among the employees in banks according to gender, academic qualification and years of experience, where the results showed the following:

- 1- There are statistically significant differences in job performance among the employees in the banking sector according to the gender variable, where the value of T reached (7.05) and in statistical terms (0.00), which is a statistical indication, and it means that males perform better.
- 2- The existence of statistically significant differences in job performance among the employees in banks according to the academic qualification, as the value of T (-2.61) and in statistical significance (0.009), which is a statistically significant one, and it means that those with an academic qualification are the best performance.
- 3- The existence of statistically significant differences in job performance among the employees in banks according to years of experience, where the value of F is (25.85) and in statistical terms (0.00), which is a statistically significant one, and it means that the owners of years of experience (16-20 years) are the best performance.

5. Discussion

After collecting and analyzing data, the several results are emerged, while the level of importance of artificial intelligence in commercial banks in Jordan, the results showed that the level of importance of artificial intelligence in job performance is

moderate, because the management in the bank does not rely on neural networks in processing its data, or in deriving data. In addition, it does not have multiple options in performance, and the databases that have neural networks are devoid of artificial intelligence. Also, banks do not have expert systems on which to rely on functional performance and thinking processes, as they rely on computer systems of medium complexity.

In addition, the results showed the validity of the main hypothesis, as artificial intelligence affects job performance through GA, and IA. This is because banks rely on GA in their performance to find smart solutions and non-digital issues, and help the managers to reach performance results quickly, also these GA are constantly being developed in the changing environment. On the other hand, IA affects the job performance by helping bank managers to make administrative decisions within a stored database, also they use IA as an alternative to human agents in order to reduce the cost of transactions and help to reduce the time used to reach the desired goal. This means that the more interest in artificial intelligence through GA, and IA, the more efficient the level of job performance in commercial banks in Jordan.

But on the other hand, the results showed that ES and NN do not affect on the job performance in commercial banks in Jordan, despite the high level of management interest in both dimensions by technological development used in banks, but they do not affect job performance.

As for the sample of the study, the results found that commercial banks in Jordan depend more on males in their management than females, and that the academic qualification (masters) is sufficient in performing the required job tasks, and also that years of experience from 10 to 20 years are necessary to raise performance efficiency. This indicates that gender, academic qualification, and years of experience affect in job performance among employees in commercial banks in Jordan, through the ability to overcome the difficulties encountered while working at the bank, the Knowledge of the fundamentals and concepts are related to work in the bank, the knowledge of the bank's systems and procedures, the following up on developments in the field of work in the bank, and the possibility of assuming higher responsibilities within the job at the bank. Thus, there is a stronger and more powerful functional performance.

6. Conclusion

This study aimed to know the effect of artificial intelligence with its variables (ES, NN, GA, and IA) on job performance. The study used previous literature and published research in order to build a model that demonstrates this effect, it used artificial intelligence as an independent dimension and job performance as a dependent dimension, then the hypotheses and questions of the study were constructed. In addition, the study developed a scale to collect data and know the opinions of managers in banks to reach the objectives of the study. After analyzing the data, results appeared that confirm the validity of the hypotheses imposed by the study, and the study questions were answered.

This study concluded that artificial intelligence directly affects job performance through (GA, and IA) only, and within certain conditions and specific experiences that characterize managers in the bank. Also, the interest in artificial intelligence increases the bank's efficiency and strengthens its ability to perform banking internally and externally.

The study recommends that researchers should work on future studies for the same variables and the study community, but for another country to generalize the results and reach measures that raise the job performance of the banking sector.

References

- Agrawal, A., Gans, J., & Goldfarb, A. (Eds.). (2019a). *The economics of artificial intelligence: an agenda*. University of Chicago Press.
- Agrawal, A., Gans, J. S., & Goldfarb, A. (2019b). Artificial intelligence: the ambiguous labor market impact of automating prediction. *Journal of Economic Perspectives*, 33(2), 31-50.
- Ajam, M. D. I. M. H. (2018). Artificial Intelligence and its Implications for High Performance Organizations-Exploratory Study in the Ministry of Science and Technology. *Journal of Administration and Economics*, 115.
- Alhashmi, S. F., Salloum, S. A., & Abdallah, S. (2019, October). Critical success factors for implementing artificial intelligence (AI) projects in Dubai Government United Arab Emirates (UAE) health sector: applying the extended technology acceptance model (TAM). In *International Conference on Advanced Intelligent Systems and Informatics* (pp. 393-405). Springer, Cham.
- Aljaber, G. M. O. (2020). *The Impact of Artificial Intelligence (AI) on the Efficiency of Accounting Systems in Jordanian Banks*, Unpublished MA Thesis, Department of Accounting, Middle East University, Jordan.
- Atom, B. (2019). Neural networks in information technology, *E3arabi*, from: <https://e3arabi.com/>.
- Baltzan, P. & Phillips, A. (2008). *cBusiness Driven Information Systems*, McGraw-Hill/Irwin, New York.
- Bikeev, I., Kabanov, P., Begishev, I., & Khisamova, Z. (2019). Criminological risks and legal aspects of artificial intelligence implementation. In *Proceedings of the International Conference on Artificial Intelligence, Information Processing and Cloud Computing* (pp. 1-7).
- Chukwudi, O. L., Echefu, S. C., Boniface, U. U., & Victoria, C. N. (2018). Effect of Artificial Intelligence on the Performance of Accounting Operations among Accounting Firms in South East Nigeria. *Asian Journal of Economics, Business and Accounting*, 7(2), 1-11.
- Farhi, E. (2017). Administrative empowerment and its impact on job performance, Unpublished master's thesis, to obtain a

- master's degree in sociology, development and management of human resources, Al-Arabi Al-Mahdi University, Sudan.
- Frank, M. R., Autor, D., Bessen, J. E., Brynjolfsson, E., Cebrian, M., Deming, D. J., ... & Wang, D. (2019). Toward understanding the impact of artificial intelligence on labor. *Proceedings of the National Academy of Sciences*, 116(14), 6531-6539.
- Kamble, R., & Deepali, S. (2018). Applications of Artificial Intelligence in Human Life. *International Journal of Research – Granthaalayah*, 6(6).
- Kenji, S. (2013). *Artificial Neural Network: Architectures and Applications*. McGraw-Hill/Irwin, New York.
- Kharshi, F. (2019). *The effectiveness of the job performance of human resources management and its role in achieving distinguished performance*", Unpublished master's thesis, to obtain a master's degree in Administration and management Department, University of Muhammad Boudiaf Al-Masila, Algeria.
- Koopmans, L., Bernaards, C. M., Hildebrandt, V. H., De Vet, H. C., & Van der Beek, A. J. (2014). Construct validity of the individual work performance questionnaire. *Journal of Occupational and Environmental Medicine*, 56(3), 331-337.
- Kumar, M. (2018). Understanding Genetic Algorithms in the Artificial Intelligence Spectrum, from: <https://medium.com/>.
- Mazaryazdi, A & Soleimani, K. (2010). *The Necessity of Using Expert Systems in Finance and Accounting Realm. Tadbir Journal*, 27.
- Muda, I., Rafiki, A., & Harahap, M. R. (2014). Factors Influencing Employees' Performance: A Study on the Islamic Banks in Islamic Science University of Malaysia University of North Sumatera. *International Journal of Business and Social Science*, 5(2), 73–81.
- O'Brien, A. J. (2000). *Introduction to Information Systems, Essentials for the Internetworked Enterprise*. 9/d., McGraw-Hill/Irwin Inc.
- Petropoulos, G. (2018). The impact of artificial intelligence on employment. *Praise for Work in the Digital Age*, 119.
- Pradhan, R. K., & Jena, L. K. (2017). Employee performance at workplace: conceptual model and empirical validation. *Business Perspectives and Research*, 5(1), 69–85. doi.org/10.1177/2278533716671630.
- Ramdani, Z., Marliani, R., & Rahman, A. A. (2019). The individual work performance scale: A psychometric study and its application for employee performance. *Humanities & Social Sciences Reviews*, 7(5), 405-414.
- Sayidy (2018). *The impact of artificial intelligence technologies on human resources and employment*. Electronic magazine money and business, from: <https://www.sayidy.net/article/102131>.
- Scherer, M. U. (2016). Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies. *Harvard Journal of Law & Technology*, 29(2).
- Sekaran, U. (2011). *Research methods for business: A skill building approach*. John Wiley & Sons.
- Shaw, J., Rudzicz, F., Jamieson, T., & Goldfarb, A. (2019). Artificial intelligence and the implementation challenge. *Journal of Medical Internet Research*, 21(7), e13659.
- Shi, Z. (2019). *Advanced artificial intelligence* (Vol. 4). World Scientific.
- Shukla, S., & Vijay, J.F. (2013). Applicability of Artificial Intelligence in Different Fields of Life, *International Journal of Scientific Engineering and Research (IJSER)*, 1(1).
- Simin, S. S. & Malekian, F. & Alizadeh, F. & Taheri, M. & Ashouri, A. (2013). Investigate the Effect of Expert Systems Application on Management Performance. *International Journal of Contemporary Research in Business*, 4(12).
- Tuomi, I. (2018). The Impact of Artificial Intelligence on Learning, Teaching, and Education. Policies for the future, Eds. Cabrera, M., Vuorikari, R & Punie, Y., EUR 29442 EN, *Publications Office of the European Union*, Luxembourg, ISBN 978-92-79-97257-7, doi:10.2760/12297, JRC113226.

