

## The Impact of Artificial Intelligence on the Economy in Jordan

By

**Fedel Mayuf Al-habashneh**

Associate Professor, Economics Business & finance Department Economics and Business  
Administration College, Mutah University, Jordan

Email: [Fhabashneh@mutah.edu.jo](mailto:Fhabashneh@mutah.edu.jo)

Email: [Fedelhabashneh@yahoo.com](mailto:Fedelhabashneh@yahoo.com)

### Abstract

The study aimed to show the impact of the use of artificial intelligence methods on the Jordanian economy, as well as to show the impact of big data on the variables of the Jordanian economy. The study relied on the questionnaire to obtain the primary data. The study sample consisted of workers in the Ministry of Digital Economy and Entrepreneurship in Jordan. Some questionnaires were distributed to the study sample, and 34 questionnaires were retrieved. Among the most important results of the study: Big data has a positive impact on obtaining economic information from more than one side and from several specializations, and this matter results in the presence of integration in obtaining economic information from several different methods and points of view, which helps positively on the economy in Jordan. The study also showed that artificial intelligence imposed on the Jordanian economy a new reality on the nature of the skills and competencies that must be available in workers so that employment can keep pace with market developments in economic terms, and artificial intelligence imposed activities that must be available in the market so that the company can continue in the market and compete in Domestic and international market. Among its most important recommendations: the need for the state to monitor the developments of artificial intelligence in various economic sectors and the need to determine the risks and benefits of artificial intelligence on economic variables such as unemployment and income distribution. The study also recommended the necessity of having committees of several specializations whose function is to review the huge data, ensure its credibility, and identify the important ones on the economic variables in Jordan.

**Keywords:** artificial intelligence; Big data analysis; Jordan.

### 1. Introduction

Although global economies have accompanied many technological breakthroughs that led to the completion of the duties previously performed by employees, experts expect that the major developments of artificial intelligence will affect differently, because it has become a major participant in the performance of tasks and duties performed by humans. Artificial intelligence is a concept found to describe machines that perform human-like cognitive processes such as learning, understanding, reasoning, and interaction. It can take many forms, including technical infrastructure (i.e. algorithms), part of a process (production), or end user of the product. It is expected that artificial intelligence will lead to a major change in the methodology by which modern societies live and the method of work used. Smartphone app assistants, for example, perform a variety of functions for users. With the rise of artificial intelligence comes important questions about how it affects businesses, consumers, and the economy in more general terms. Workers are increasingly interested in knowing what the importance of artificial intelligence is to their business and income, and business organizations are also interested in creating new methods through which they can take advantage of the

opportunities presented by this powerful phenomenon. Information technology tools have helped to accumulate and share large amounts of valuable data, which are now more accessible than ever before. This has created an impetus for artificial intelligence technologies. From the above, it can be said that the presence or use of artificial intelligence has opportunities and risks for the economy in Jordan, which necessitates the necessity of anticipating risks and making an approach to deal with them, in addition to anticipating opportunities and how to act with them to advance the market economy in Jordan. Therefore, this study aimed to find the impact of using artificial intelligence techniques on the economic aspects in Jordan.

### ***1.1 The study Problem***

Artificial intelligence can increase growth by providing an enhancement in several ways of producing ideas. In theory, artificial intelligence is considered to have positive effects on growth because it supports the process of producing goods and services, and in return it has risks related to employment as it is a substitute for human labor with machines, and here it is necessary to find new ideas related to creating a flexible labor market, meaning that as long as there are risks from the use of artificial intelligence, then New opportunities are created by dealing with those risks. Therefore, the problem of the study lies in the following:

- 1- What is the impact of using big data technologies on the economy in Jordan?
- 2- What is the impact of using artificial intelligence methods on the economy in Jordan in terms of unemployment, poverty and income distribution?

### ***1.2 Objectives of the study***

The objectives of the study are as follows

- 1- Identifying the positive and negative effects of using artificial intelligence on the Jordanian economy.
- 2- Identifying the impact of using big data methods on enhancing economic outputs in Jordan.
- 3- Identifying the effects of the use of artificial intelligence on economic aspects in Jordan such as poverty, unemployment, economic growth and income distribution.
- 4- Coming up with results and recommendations that may help economic analysts in doing future research on the subject of artificial intelligence and its impact on the economic aspects in Jordan.

### ***1.3 the importance of studying***

The economic situation is considered the most important situation in improving legal procedures in general, and the emergence of the investment law in particular, and the production process for robots represents the basic base from which most of the applications and technology that currently exist in the development of artificial intelligence resulted, and there is also a new quality of finding widely used methods, which enable Countries that participate in it should develop significantly in the field of economic development.

The economy of artificial intelligence is also interested in studying the basic ideas of artificial intelligence approaches related to investment mechanisms, starting with expenses that provide ways to finance artificial intelligence studies in research centers, business organizations and companies, and even the economic effects of the presence of artificial intelligence.

For global development, artificial intelligence has advantages and disadvantages. The use of artificial intelligence can enhance the overall productivity and generate new products

that will enhance the economy and create suitable job opportunities for the labor force, which may have positive effects on the factors of poverty and unemployment in Jordan.

Artificial intelligence is also important because it forms the basis of computer learning. Through artificial intelligence, computers have the ability to harness huge amounts of data and use their acquired intelligence to make optimal decisions and discoveries in portions of the time it takes humans, which means the possibility of cost savings, which will positively affect wages, salaries, and prices of goods and services.

#### ***1.4 study hypotheses***

Based on the study problem, the following hypotheses can be formulated for the study

- 1- There is no statistically significant effect on the use of big data technologies on the economy in Jordan.
- 2- There is no statistically significant effect on the use of artificial intelligence methods on the economy in Jordan in terms of unemployment, poverty and income distribution.

#### ***1.5 Previous studies***

##### ***Gries (2022) study entitled Modeling artificial intelligence in economics***

The study aimed to integrate artificial intelligence tools with human resources in order to provide high-quality products. Among the most important results of the study: There is a positive relationship between human resources and the production of goods and services. Experts play an important role in the field of applying artificial intelligence in the economy. Among its most important recommendations: the necessity of linking the productivity of goods and services using artificial intelligence to economic aspects and finding alternatives to the risks of artificial intelligence to the economy in general.

##### ***Hernandes (2017) study entitled Evaluation in artificial intelligence: from task-oriented to ability-oriented measurement.***

This study aimed to identify the opportunities and risks of using artificial intelligence on economic development. The study relied on the theoretical method represented in previous studies. One of the most important results of the study is that practical skills have an impact on mitigating the effects of artificial intelligence on development. There are restrictions that limit the use of artificial intelligence in the economy. Among its most important results: Carrying out an economic feasibility study on the opportunities and risks of using artificial intelligence before applying it in any field. Analyze some of the assessment tests from AI that are best positioned to perform ability-oriented assessment and discuss how their problems and limitations can be addressed using some tools and ideas

##### ***Lu (2021) study entitled the impact of artificial intelligence on economic growth and welfare***

The study aimed to demonstrate the impact of artificial intelligence on economic growth and achieve economic well-being, as well as to demonstrate the impact of artificial intelligence on balanced growth. The study relied on analyzing some companies located in the United States to find their impact on economic growth. Among its most important results: It can increase the benefit of the family in the short term if the increase in the accumulation of artificial intelligence results from an increase in productivity in the commodity sector or artificial intelligence, and that the development of artificial intelligence is not necessarily beneficial to the well-being of the family in the long term. Developing the skills and mental abilities of employees, which has positive effects on achieving the well-being of members of society, and interest in developing artificial intelligence companies in the United States.

***Al-Husban Study, Mujahem (2016) "The Impact of Methods and Means of Intellectual Capital Accounting in Achieving Competitive Advantage - An Applied Study on Islamic Banks in Jordan"***

The study aimed to show the application of intellectual capital accounting on the fair value statement of the company, and its impact on the outputs of the accounting system. The questionnaire was used as a tool for the study. The study sample was accountants and internal auditors in Islamic banks in Jordan. One of the most important results of the study was: the use of intellectual capital measurement systems, which have become one of the most important indicators that reflect the development of managerial thought. And the way it manages it in the long term contributes greatly to the attempt to make optimal use of the resources of Islamic banks, especially technological resources and human resources. Among the most important recommendations of the study: the possibility of expressing the value of intellectual capital in monetary form, considering intellectual capital as a way to develop relations with internal and external parties. The different external because it helps to increase the disclosure that helps to enhance the reputation of the company.

***Olian (2022) "Can artificial intelligence improve green economic growth? Evidence from China"***

The study aimed to find the degree of possibility of applying artificial intelligence to improve economic growth associated with the environment, through application to companies in China. The study relied on the analytical method of economic data for artificial intelligence companies and to determine its impact on achieving green economic development (green environment). One of the most important results of the study: that artificial intelligence can promote local green economic growth, but it had a siphon effect on neighboring green economic growth. From the perspective of dynamic effects, the impact of AI enhancement on green economic growth is relatively weak in resource-based cities. Among its most important recommendations: Paying attention to the presence of artificial intelligence as one of the tools that help preserve the environment and help promote economic growth at the level of individuals and the state in general.

***Al-Badi Study (2021) "The Impact of Artificial Intelligence on the Labor Force"***

The study aimed to find out the impact of the use of mechanisms and applications of artificial intelligence on human resources and the nature of human resource jobs. It also aimed to show the impact of artificial intelligence on jobs in the future and to identify the challenges facing the labor force. The study relied on the theoretical method in obtaining the primary data for the study. Among the most important results of the study: There is an impact of the use of artificial intelligence applications in terms of how to distribute the benefits of artificial intelligence among members of society and how to manage the risks and benefits of artificial intelligence applications on the labor market. Among its most important recommendations: the need to make a comprehensive plan for how to identify jobs affected by the use of artificial intelligence, work to identify mechanisms for dealing with the risks of artificial intelligence applications on the labor market, and work to accurately identify the affected jobs or jobs created from the use of artificial intelligence applications.

***Atalla's study (2020) "The impact of the artificial intelligence economy on economic growth"***

The study aimed to know the positive and negative effects of the artificial intelligence economy on economic growth in China and America. The study was based on analyzing data for the years 2010-2018 in terms of the variables of trademark registration, patents and scientific research. Among the most important results of the study: There is a positive impact of patent processes and spending on scientific research to a greater extent than the registration of trademarks in China and the United States of America. Among its most important

recommendations: the need to pay attention to spending on scientific research and the need not to monopolize knowledge and spread it to all.

#### ***1.5.1 The following is noted from previous studies***

- 1- Some of them depend on theoretical studies in obtaining primary data of the impact of artificial intelligence on some economic aspects, so that they lack the practical aspect in the work of the study in order to obtain practical results from the economic reality.
- 2- It focuses on manpower and identifying the jobs required from the use of artificial intelligence applications, in terms of job structure and identifying risks to jobs in addition to how to take advantage of the risks and benefits of using artificial intelligence technology.

#### ***1.5.2 Additions from the current research***

- 1- It focuses on knowing the effect of using artificial intelligence applications on new variables such as unemployment and income distribution, and how to deal with them in the economic environment in Jordan.
- 2- It focuses on the impact of social networking tools (big data) as one of the results of artificial intelligence on economic variables in Jordan.
- 3- It is based on a field study and relying on a questionnaire to obtain preliminary data and draw conclusions and recommendations.

## **2. Theoretical framework**

### ***2.1 Introduction***

Artificial intelligence is considered as one of the economic phenomena that have an impact on the division of labor, and it also helps to create a new work environment that did not exist in the past, which may have positive and negative effects on the culture of a particular society. Artificial intelligence also has repercussions on the nature of the skills that must be present in the labor market and the nature of the people who will perform the functions of artificial intelligence applications. Artificial intelligence technology is improving with many basic benefits for the economy, society and individuals. Artificial intelligence technologies across different sectors also provide commitment to spreading productivity and discovering new products and services. (Brynjolfsson,2017),

Artificial intelligence (AI), which is changing the way we do things, and how we interact with others, is creating massive social change without directly complicating human relationships. However, modern artificial intelligence has an enormous impact on how we do things as well as the ways in which we relate to each other. To meet this challenge, new principles of AI bioethics must be considered and developed to provide guidance for AI technology to monitor so that the world can benefit from the advancement of these new intelligences. (Tai, 2020)

From the foregoing, it can be concluded that artificial intelligence has become affecting the nature of industries in the economy of countries, and therefore it has positive effects and negative effects on the nature of the composition of the workforce structure, the nature of skills and the nature of competencies that must be available to individuals and institutions so that they can continue to continue in the market and achieve targeted profits.,

### ***2.2 The concept of artificial intelligence***

Artificial intelligence can be defined as follows

- 1- It is the simulation of human intelligence activities by means of machines, especially the tools of modern technology. Specific applications of AI include expert systems, native language processing, process recognition, and machine vision. (Acemoglo,2018)

- 2- It is a concept of computer science concerned with building intelligent machines capable of performing tasks that normally require human intelligence. It is an interdisciplinary science with multiple approaches, but advances in machine learning and deep learning are creating a paradigm shift in almost every sector of the technology industry. (Branolfsson,2017)
- 3- It allows machines to model and improve the capabilities of the human mind. From the development of self-driving cars to the proliferation of smart assistants, artificial intelligence is becoming an increasingly part of everyday life. As a result, many technology companies across various industries are investing in AI technologies. (Berger, 2018)

It is noted from the foregoing that artificial intelligence is a technological application that needs high human capabilities in its formation and how to deal with it. It is based on creating a quantum leap in the quality of goods and services in the economy of countries as a result of its reliance on smart machines and equipment as a substitute for the human element.

### ***2.2.1 Types of artificial intelligence***

Artificial intelligence can be divided into the following (Lee, 2016(

- 1- Interactive machines: They have the energy and ability to perceive and interact with the world they are dealing with because they perform limited responsibilities.
- 2- Limited memory: It has the capacity and ability to store previous information and predictions to inform predictions of what might happen next.
- 3- Theory of mind: the ability to make decisions based on its perceptions of the feelings of others and to make appropriate decisions.
- 4- Self-awareness: able to work consciously at the human level and understand his existence.

It is noted from the foregoing that the types of artificial intelligence have a kind of integration until reaching the full application of it in a specific field, and it depends on human intelligence in the basis to obtain better results in quality and price and achieve the goals of the company.

### ***2.2.2 The importance of artificial intelligence***

The importance of artificial intelligence can be formulated as follows (Berger, 2018(

- 1- It affects all economic sectors and the components of the human element and its dealings with modern technology tools such as big data, the Internet of things and robots.
- 2- It has an impact on the health sector in terms of reducing treatment and laboratory costs and reducing time and effort to perform health care tasks.
- 3- It also increases the effectiveness of the business and the speed of its implementation, increases its value, and has an impact on improving the business in a continuous manner. It also increases the number of those interacting with these businesses due to the continuous development of related tools and software.

### ***2.2.3 Uses of artificial intelligence***

Artificial intelligence is used as follows: (Melezer,2018)

- 1- Computing - AI is able to compute a repetitive task that was previously done manually, without feeling any fatigue or having to take breaks like a human employee would need to do.

- 2- Improvement - to make goods and services smarter and more efficient, and to improve experiences for customers, through the development of chatbots or customer service lists, and to provide better product recommendations.
- 3- Analysis - AI can analyze information much faster than a human, allowing it to find appropriate routes more quickly, and it can analyze much larger sets of information than a human, allowing it to detect patterns that humans might simply miss.
- 4- Accuracy - using his ability to process and summarize data to reach better decisions for responsibilities such as financial investment decisions.
- 5- Return on Investment - Maximize the value of information because it has the ability to do a better job of analyzing complex and multiple relationships, without having to take any breaks and with fewer errors, making it an incredibly important technology for any data-driven business that runs on wide range.

#### **2.2.4 The impact of artificial intelligence on society**

Artificial intelligence affects the components of any society with the following (Khaled, 2020)

- 1- It develops the quality of daily life by performing routine and even complex work in a better way than the human element, which makes life simpler, safer and more effective.
- 2- It poses significant risks to privacy, and leads to an increase in racism through the presence of one person performing several tasks,
- 3- It costs workers their jobs, which leads to an increase in unemployment.
- 4- The modern technology of artificial intelligence has become a part of our daily lives, and it represents the future of the economy in countries,
- 5- AI developments are already affecting the economy in terms of individual wealth or broader financial changes.

#### **2.2.5 Effects of artificial intelligence on the economy**

Artificial intelligence affects the economy with the following ((Ernst, 2018)

- 1- The nature of production processes is based on orders of machines and technology techniques instead of the human element, which means that there is a radical change in the manufacturing and production process.
- 2- Increasing communication tools between members of society and between individuals and institutions through the use of artificial intelligence tools or techniques
- 3- The decision-making process is not only in the hands of an economist, but also the integrated artificial intelligence algorithms and the machine have the final say.
- 4- The factors of artificial intelligence and their main features have the ability to improve the components of economic activity or weaken it if it is misused.
- 5- Its impact on the pricing of goods and services, wages, productivity speed, and the expected impact of robots on the unemployment rate, and finally the work of field economic studies through artificial intelligence methods.
- 6- Increasing the state's gross domestic product by influencing prices, unemployment rates, and the quality of goods and services.
- 7- The process of competition between countries is not limited to energy sources only, but has expanded to the applications of artificial intelligence and the great economic leaps they represent.
- 8- Artificial intelligence encourages the economic component by replacing labor with capital, either in the manufacture of goods and services or in the formation of ideas.
- 9- It is also expected that artificial intelligence will hinder economic growth if it is associated with an inappropriate competition policy.

### ***2.2.5.1 Benefits of using artificial intelligence in the economy***

The application of artificial intelligence techniques helps in the process of economic growth through: (Ernst, 2018)

- 1- Computing: through transportation, communications, service industries, and consumer products. It ensures more efficient use of production inputs, reduced time consumption, increased product quality, and better safety.
- 2- Improving customer experience Helps to quickly respond to customer complaints and inquiries and treat them more efficiently. Helps reduce pressure on customer service staff.
- 3- Make Smarter Decisions: By delivering data, it helps find consistency in data, analyzes trends, identifies uncertainties, and provides predictions to make the best decision for any business organization.
- 4- Researching and analyzing data through analyzing data in an effective manner. Helps create forecasting algorithms and models to interpret data and measure expected outcomes for different scenarios and trends
- 5- Finding solutions to big problems by finding easy ways to solve complex problems. From personal interaction with customers and fraud detection to medical diagnoses
- 6- Developing a lifestyle so that life becomes digital, dealing with machines and equipment.

### ***2.2.5.2 The effects of artificial intelligence on combating poverty and employment factors***

Artificial intelligence helps poverty in the following: (Petroboulos, 2018)

- 1- When applying artificial intelligence techniques, operating expenses decrease and revenues and gains increase, and with the sharing of these gains between the state and the citizen, every adult will get a share of these gains without having a direct role in any of these actions.
- 2- The large productivity returns of artificial intelligence can "make the society of the future less divided, and enable everyone to share in the gains of artificial intelligence distributed to members of society continuously."
- 3- With the further acceleration of development, artificial intelligence will "create great wealth", and in turn, the price of labor will "drop to zero".
- 4- Wealth will come from business organizations operated by artificial intelligence and the lands it reclaims, in exchange for the state imposing taxes on capital, not labor, and these taxes must be distributed among the members of society.
- 5- The application of artificial intelligence mechanisms requires the presence of public safety tools, which do not exist at all, which means creating new jobs that require a variety of skills.
- 6- Artificial intelligence has created new competencies and skills that did not exist previously, which means that there is an impact of artificial intelligence on the experiences and skills of employees to keep pace with developments in artificial intelligence technology.
- 7- The entry of companies specialized in the field of artificial intelligence and big data, which means the need for qualified people with new and rare specializations to continue local and international competition operations.
- 8- Investing in artificial intelligence talents, data and process change. So that the investment is only in technology, but rather it is related to the desired value, managing implementation risks, while discovering the opportunities associated with it



### ***2.2.5.3 The effects of artificial intelligence on economic growth***

There are positive and negative effects of artificial intelligence on economic growth, which are: (Atallah, 2020)

#### ***First: the positive effects***

- 1- Expanding the amount of production of goods and services and reaching the level of self-sufficiency in food industries
- 2- Reducing operating expenses, which reflects positively on increasing profits
- 3- Work to reduce negative impacts on the environment
- 4- Increasing productivity and achieving competitive advantage in the production of goods and services
- 5- Work to find innovative opportunities for economic growth

#### ***Second: the negative effects***

- 1- High production prices, whether for goods or services
- 2- Increasing unemployment and poverty for those who do not have the skills or capabilities of artificial intelligence
- 3- Increasing the gap between industrialized countries and non-industrialized countries
- 4- Replacing machines and technology with manpower
- 6- Influence on the culture of the community of customs and traditions

## ***2.3 Big data and artificial intelligence***

### ***2.3.1 Big data***

The concept of big data: Big data is defined as a large and wide volume of official data and unofficial data that is mined within business organizations and is developed on a daily basis, and the main factor in it is how to operate this data to achieve full benefit to achieve the goals of business organizations. )Emly,2018 (.

### ***2.3.2 General features of big data***

There are the following characteristics of big data (Youssef,2018).

- 1- Size: It is distinguished by its large size and its need for computer technology and information to help understand that input or data.
- 2- speed: Big data needs great speed to deal with it in terms of receiving and processing it through advanced technology
- 3- Diversity: from different sources on different topics that require experts to be able to analyze them for purposes of use
- 4- Honesty: since large data has stability and accuracy if it is from a credible source so that the quality of data and information can be guaranteed by internal and external parties.

### ***2.3.3 The impact of big data on the quality of economic data***

There are the following effects of big data on economic information, which can be summarized as follows: (Irene, 2019)

- 1- The effect of big data and its relationship to the ability to understand the financial data, through
  - Improving the quality of economic data and improving its content.
  - Helps find other means to understand economic data and indicators through the presence of additional sources of data

- Improving understanding and realizing the performance of business organizations from an economic point of view.
- 2- The relationship of big data with the characteristic of the comparison process to find a true representation of economic data through:
  - Improve the forecasting of future profits.
  - Improving the means of predicting future economic growth and future sales.
  - Improving the future performance of the company in general
- 3- The relationship of big data with the honest representation of financial events in economic data and indicators through:
  - The existence of an integration process in economic information and indicators
  - Improving risk prediction and mechanisms for dealing with them in the future
  - Improving the credibility of the financial statements

### ***2.3.4 The importance of using big data in economic indicators***

It can be summarized as follows: (Muller, 2018)

- 1- Each of them interacts with the other to reach the degree of non-conflict of functions and the degree of complementarity. Through the existence of a positive and direct relationship in the quality of big data.
- 2- Big data is simply useless without realistic analysis from reliable sources of economic data
- 3- The use of big data requires specialists in various fields of engineering, medical, economic and financial disciplines so that it can be analyzed to a degree commensurate with the reality and truthfulness of events and economic indicators.

### ***2.3.5 Relationship between big data and artificial intelligence***

We haven't solved the storage issues of AI for big data and analytics yet. But it is not as high as it was in the past. Nowadays, new problems have appeared. They are infrastructure, data preparation, and governance (Luan,2020).

- 1- Anomaly detection - AI can analyze AI data to detect abnormal events in the data. For example, having a network of sensors that have a suitable predetermined range. Anything outside this range is an anomaly.
- 2- Probability of a future outcome – using a known condition that has a certain probability of affecting a future outcome, AI can determine the probability of that outcome
- 3- AI can recognize patterns - AI can see patterns that humans don't know
- 4- Data Bars and Charts - AI can look for patterns in bars and charts that might remain undetected by human supervision

## **3. Statistical analysis**

### ***3.1 The study population and its sample***

The study population consists of employees working in the Department of Policies and Information at the Ministry of Digital Economy and Entrepreneurship in Jordan. The sample of the study is the Directorate of Policies and Strategies, which is a directorate affiliated to the Department of Policies and Information. The study sample and society were selected for the following justifications:

- 1- The Ministry of Digital Economy and Entrepreneurship is generally concerned with studying economic indicators and their effects on the Jordanian investment environment.

- 2- The Department of Policies and Information is concerned with the use of modern technology and determining its impact on the economic environment in Jordan.
- 3- The Directorate of Policies and Strategies is concerned with the issue of artificial intelligence, as evidenced by the existence of a special department concerned with artificial intelligence

The total number of employees working in the Department of Policies and Information was (81) employees at the end of the year (2022), while the study sample had a total of 38 employees. 38 questionnaires were distributed, and 34 questionnaires were retrieved, and the recovery rate was 88%.

### 3.2 Description of the characteristics of the study sample

**Table No. (1)** Distribution of the study sample according to personal and occupational variables

Variable	Level	Frequencies	Percentage
Qualification	College	5	14
	University	22	65
	High diploma	2	5
	Master	3	9
	P,HD	2	7
	Total	34	100
Academic specialist	Accounting	4	12
	Finance	6	18
	Business administration	7	21
	Economic	12	36
	MIS	5	13
	Total	34	100.0
Experience	Less than 5 years	4	12
	5-10 years	11	31
	11-15 years	8	26
	More than 15 years	11	31
Total		34	100.0

Table No. (1) shows the following:

- 1- The highest percentage of the study sample distribution according to the educational qualification variable was (65%) for the educational qualification (Bachelor), while the lowest percentage was (7%) for the scientific qualification (PhD), and the reason for the high percentage of the bachelor's degree is that most Individuals of Jordanian society who are ready for the labor market hold a (Bachelor's) degree, in addition to the existence of some jobs that require a Bachelor's degree as a minimum
- 2- The highest percentage of the study sample distribution according to the scientific specialization variable was (36%) for the scientific specialization (economics), while the lowest percentage was (13%) for the scientific specialization (management information systems), and this result indicates that the study sample members are qualified Sufficient qualification to enable them to answer the questions of the study tool in a peaceful manner.
- 3- The highest percentage of the distribution of the study sample according to the variable of years of experience in the field of government work was (31%) for years of experience (15 years or more), while the lowest percentage was (12%) for years of experience (less than 5 years), and this result indicates High levels of job stability.

### 3.3 Data analysis database

To analyze the data and test the hypotheses of the study, the five-point Likert scale was used to answer the questions, according to the following score:

**Schedule (2) Resolution scale test**

Title	Level
More agree	5
Agree	4
Neutral	3
Not agree	2
Not more agree	1

As for the limits adopted by this study when commenting on the arithmetic average of the independent variables in its model to determine the degree of attitude, the researcher identified three levels (high, medium, low) based on the following equation:

The length of the period = (the upper limit of the alternative - the lower limit of the alternative) / the number of levels

$$(5-1)/3 = 4/3 = 1.33, \text{ so the levels are as follows:}$$

- The degree of approval is low if the arithmetic mean ranges between (1.00 - less than 2.33)
- The degree of approval is medium if the arithmetic mean ranges between (2.33-less than 3.66)
- The degree of agreement is high if the arithmetic mean ranges between (3.66-5.00)

### 3.4 Tool stability:

To ensure the stability of the tool, the Cronbach Alpha equation was applied to all items of the study variables, as shown in Table (3), which shows the stability coefficients.

**Schedule (3) Stability coefficients (Cronbach alpha) for the study variables)**

Variable	Paragraph numbers	Paragraphs total	Cronbach alpha
Big data	1-9	9	76%
artificial intelligence methods	10-19	10	89%
Total	1-19	19	81%

Table No. (3) Shows that all the values of stability coefficients using (Cronbach alpha) were acceptable for application purposes, as they ranged between (0.76-0.89). Studies have indicated the acceptance of stability coefficients and all of them are acceptable values for application purposes. As most studies indicated that the acceptance rate of the stability coefficient is (70 %)

### 3.5 normal distribution test

In order to ensure that the data are subject to natural distribution, the researcher used the coefficients of skewness and Kurtosis for each field of the study. Table No. (4) Shows the values of torsion and flattening for each field of the study.

**Schedule (4) Kurtosis and skewness values for the main variables of the study**

Variable	skewness	Kurtosis
Big data	51%	-20%
artificial intelligence methods	41%	-80%

It appears from Table No. (4) that the coefficients of flattening and torsion all range within the acceptable lower and upper limits of the normal distribution; The values of the skewness ranged between (-2, 2), and the values of the flattening coefficients ranged between (-7, 7), which indicates that the study data follows a normal distribution, and therefore the study data is suitable for subsequent statistical analyses.

### **3.6 Statistical methods used in the analysis:**

To achieve the objectives of the study and answer its questions and hypotheses, a set of statistical methods were used, which are included in the Statistical Package for Social Sciences (SPSS 25), which are:

- 1- Frequencies and percentages in order to describe the characteristics of the study sample.
- 2- Arithmetic means and standard deviations to identify the degree of agreement of the study sample with the paragraphs and fields of the study tool.
- 3- Cronbach's alpha equation to ensure the stability of the study tool.
- 4- Median regression and path analysis to test the validity of hypotheses related to the effect of the independent variable on the dependent variable, and the role of the mediating variable in improving this effect.

### **3.7 Results related to the impact of big data technologies on the economy:**

In order to identify the impact of big data technologies on the economy, the researcher extracted the arithmetic averages and standard deviations of the respondents' responses to the paragraphs of the first field in the study tool, which expresses the independent variable (artificial intelligence). Table No. (5) shows the descriptive results of the independent variable

**Table No. (5)** *The arithmetic means and standard deviations of the study sample's estimates for the items in the field of "big data" are arranged in descending order according to the arithmetic mean*

<b>Rank</b>	<b>No</b>	<b>Paragraph</b>	<b>Mean</b>	<b>S.D</b>	<b>level</b>
1	2	Big data helps to understand financial data by improving the quality of economic data	3.81	0.61	High
2	7	Big data helps to find additional, more reliable sources of poverty and unemployment data	3.78	0.67	High
3	9	Big data affects the improvement of obtaining more reliable information about income distribution data between individuals	3.72	0.77	High
4	5	Big data helps to improve understanding and awareness of the performance of business organizations from an economic point of view	3.69	0.59	High
5	6	Big data improves the means of predicting future economic growth and future sales	3.68	0.71	Medium
6	1	Big data helps the process of integration in economic information and indicators	3.64	0.85	Medium
7	4	Big data helps to identify the risks of economic events before they happen	3.61	0.73	Medium
8	3	Big data helps increase the credibility of an honest representation of economic events	3.56	0.61	Medium
9	8	Big data helps the country obtain high quality data in analyzing economic indicators	3.52	0.72	Medium
<b>Total</b>			<b>3.64</b>		<b>medium</b>

Through Table No. (5), it is clear that the impact of big data on economic indicators in Jordan, from the point of view of the study sample, was moderate; As the arithmetic mean for the field of "big data" as a whole was (3.64) with an average evaluation score, as shown in Table No. (5) that the arithmetic averages of the study sample's responses to the field's paragraphs ranged between (3.52-3.81) and Paragraph No. ranked first (2) And it reads: Big data helps to understand financial data by improving the quality of economic data, with an arithmetic mean (3.81) and a high evaluation score, while Paragraph No. (8) ranked last, which reads: Big data helps the state to obtain data Great quality in analyzing economic indicators.

**Table No. (6)** *Arithmetic means and standard deviations of the study sample's estimates for the items in the field of "Artificial Intelligence Methods"*

Rank	No	Paragraph	Mean	S.D	level
1	2	AI stimulates growth by replacing labor with capital, whether in the production of goods and services or in the production of ideas	3.92	0.74	High
2	9	Artificial intelligence can spur growth by providing an endless supply of producing ideas that have an impact on reducing poverty and unemployment rates.	3.78	0.64	High
3	10	Artificial intelligence has helped create new jobs in the market that did not exist previously, which will reflect positively on reducing poverty and unemployment rates	3.72	0.67	High
4	4	Increased workforce productivity and AI-centric technologies such as assistance, autonomy, and augmented intelligence	3.65	0.75	medium
5	8	Increasing demand for high-quality products and services enhanced in artificial intelligence applications.	3.64	0.68	medium
6	1	The advanced technologies of artificial intelligence have contributed so that smart phones have contributed to improving education and making life more luxurious and easier.	3.58	0.83	medium
7	6	Artificial intelligence methods have influenced the creation and development of new markets with high economic value.	3.57	0.56	medium
8	5	Artificial intelligence methods helped build a strong database in the field of innovative research and development in economic fields	3.56	0.87	medium
9	7	Artificial intelligence methods helped enhance the concept of corporate governance in analyzing economic data, which contributed to enhancing the credibility of data and economic results	3.55	0.70	medium
10	3	Artificial intelligence methods helped create new skills and capabilities that contributed to enhancing the continuity of business organizations in the market and revitalizing the economy in general	3.54	0.75	medium
<b>Total</b>			<b>3.62</b>		

Through the results related to the standard deviations of the paragraphs of this variable, it is found that they have ranged between (0.59-0.85), which indicates that there is an impact

of the use of data on the interpretation of economic indicators in Jordan, and this means that the big data (social communication tools) contributed positively to obtaining It obtained information from various economic sectors that helped in the integration of data and information related to economic fields, and this had a positive impact on improving economic indicators in Jordan to some extent or to a medium degree.

Results related to the impact of artificial intelligence methods on economic indicators:

By presenting the identification of the level of reducing financial violations, the researcher extracted the arithmetic averages and standard deviations of the respondents' answers for the paragraphs of the second field in the study tool, which expresses the dependent variable (artificial intelligence methods). Table No. (6) Shows the descriptive results of the dependent variable.

Through Table No. (6), it is clear that the impact of artificial intelligence methods on the economy in Jordan, from the point of view of the study sample, was moderate; As the arithmetic mean for the field of "Artificial Intelligence Methods" as a whole was (3.51) with an average evaluation score, as shown in Table No. (6) that the arithmetic averages of the study sample's responses to the field's paragraphs ranged between (3.54-3.92) and the paragraph ranked first. No. (2) and its text: Artificial intelligence stimulates growth by replacing labor with capital, whether in the production of goods and services or in the production of ideas, with an arithmetic mean (3.92) and a high evaluation score, while Paragraph No. (3) ranked last, which reads: Methods have helped Artificial intelligence creates new skills and capabilities that contribute to enhancing the continuity of business organizations in the market and revitalizing the economy in general, with an arithmetic average of (3.54) and an average evaluation score.

Through the results related to the standard deviations of the paragraphs of this variable, it is found that they have ranged between (0.56-0.87), which indicates that the level of data dispersion from the arithmetic mean is relatively low, and this result can be justified by the weakness in the existence of systems and instructions that regulate the nature of business and activities related to intelligence Industrial and how to address the economic problems that arise from the use of artificial intelligence methods in general.

### 3.8 Hypothesis testing

Results related to the first hypothesis 1H0: There is no statistically significant effect on the use of big data technologies on the economy in Jordan.

To validate this hypothesis, a simple regression equation was applied to study the impact of big data on the economy in Jordan. Table No. (7) illustrates this.

**Schedule (7) Simple regression equation to study the impact of big data on the economy**

Variable	non-standard factors		unified factors		Significant	R	R <sup>2</sup>	Adjusted R Square	F	Significant
	B	Std. Error	Beta	T						
Constant	2.223	0.259		8.586	0.000	0.360	0.130	0.125	29.766	0.000
Big data	0.389	0.071	0.360	5.456	0.000					

It appears from Table (7) that there is a statistically significant effect at the level of significance ( $\alpha \leq 0.05$ ) on the use of big data technologies on the economy in Jordan, as the value of the correlation coefficient (R) was (0.360), which is a statistically significant value and indicates the degree of a statistically significant correlation. Between big data techniques and economic indicators, the value of (R-square) was (0.130), which is a statistically significant value, meaning that the big data explains what is worth (13.0%) of the change in economic indicators, and the value of the test (F) was (29.766) with a statistical significance. (0.00), and the results showed that the (Beta, T) values are positive and statistically significant, which indicates that there is a direct and statistically significant effect at the significance level ( $\alpha \leq 0.05$ ) of the impact of big data on economic indicators in Jordan. Based on the above, it is accepted The first hypothesis in the alternative formula, which states, "There is a statistically significant effect at the significance level ( $\alpha \leq 0.05$ ) of using big data technologies on the economy in Jordan."

Results related to the second hypothesis 2H0: There is no statistically significant effect on the use of artificial intelligence methods on the economy in Jordan in terms of unemployment, poverty and income distribution

To validate this hypothesis, a simple regression equation was applied to study the impact of using artificial intelligence methods on the economy in Jordan in terms of unemployment, poverty, and income distribution. Table No. (8) shows this.

**Schedule (8)** *Simple regression equation to study the impact of using artificial intelligence methods on the economy in Jordan in terms of unemployment, poverty and income distribution*  
*Simple regression equation to study the impact of big data on the economy*

Variable	non-standard factors		unified factors		Significant	R	R <sup>2</sup>	Adjusted R Square	F	Significant
	B	Std. Error	Beta	T						
(Constant) artificial intelligence methods	2.723	0.350		7.779	0.000	0.182	0.033	0.028	6.862	0.009
	0.252	0.096	0.182	2.620	0.009					

It appears from Table (8) that there is a statistically significant effect at the level of significance ( $\alpha \leq 0.05$ ) for the use of artificial intelligence methods on the economy in Jordan in terms of unemployment, poverty and income distribution, as the value of the correlation coefficient (R) was (0.182), which is a statistically significant value and indicates The degree of a statistically significant correlation between artificial intelligence methods and economic indicators, and the value of (R-square) was (0.033), which is a statistically significant value, meaning that artificial intelligence methods explain (3.3%) of the change in economic indicators, and the test value was ( F) (6.862) with a statistical significance of (0.00), and the results showed that the (Beta, T) values are positive and statistically significant, which indicates that there is a direct and statistically significant effect at the significance level ( $\alpha \leq 0.05$ ) for the use of artificial intelligence methods on the economy in Jordan in terms of unemployment, poverty and income distribution, and based on the above, the second hypothesis is accepted in the alternative formula, which states that "there is a statistically significant effect on the use of artificial intelligence methods on the economy in Jordan in terms of unemployment, poverty and income distribution."



## **4. Discuss the results and recommendations**

### **4.1 Discuss the results**

The study showed the following results

- 1- Big data has a positive impact on the existence of a true representation of economic indicators in Jordan, through the presence of several ideas and several points of view on the economic situation in Jordan.
- 2- Big data technologies have helped to find new sources to produce the ideas and capabilities needed to find a clear interpretation of economic indicators in Jordan.
- 3- The presence of big data has a positive impact on the process of distributing income among members of the same society through the dissemination of information on various social media tools.
- 4- There is a stimulus from artificial intelligence methods to find the ideas and skills necessary to operate the capital in the market, and this helps to find new job opportunities characterized by special skills with the production of goods and services.
- 5- Artificial intelligence can spur growth by providing an endless supply of producing ideas that have an impact on reducing poverty and unemployment rates.
- 6- Artificial intelligence methods helped build a strong database in the field of innovative research and development in economic fields

### **4.2 Recommendations**

Based on the previous results, the study recommends the following:

- 1- The need for big data technologies to be monitored and to be taken from reliable and accurate computer networks that can be relied upon in the interpretation of economic indicators.
- 2- The need to find specialists to review the big data and determine what is useful for making economic decisions or explaining economic phenomena.
- 3- The need to find governmental or semi-governmental regulations and instructions that regulate the work related to the sectors of artificial intelligence in order to determine the appropriate or inappropriate ones for its application to the Jordanian economy.
- 4- The need to take the risks and opportunities of using artificial intelligence in the Jordanian economy, by anticipating risks and how to deal with them in the event of their occurrence, and investing opportunities from the application of artificial intelligence in order to improve economic activity
- 5- The need for a team of several specializations whose function is to evaluate the use of artificial intelligence on poverty and unemployment and achieve justice in the distribution of income.

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