The Impact of Artificial Intelligence Applications on The Effectiveness of Recruitment and Selection processes on Telecommunication Enterprises

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Under supervition

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Abstract:

The application of Artificial Intelligence (AI) in recruitment and selection has transformed talent acquisition, especially within telecommunication companies where the need for skilled workers is ever-increasing. AI empowers enterprises to improve their recruitment procedures' efficiency and equity. This study aimed to examine the impact of (AI) applications on the effectiveness of the recruitment and selection process on telecommunication enterprises in the Arab Republic of Egypt.

The study focused on four key dimensions of AI applications: **Expert Systems, Big Data Analytics, Chatbots, and Machine Learning**. A quantitative approach was adopted, utilizing a questionnaire distributed to a sample of 240 individuals working in the human resources sector within telecommunications companies. The statistical analysis revealed a significant and

positive impact of all these dimensions on enhancing the efficiency and effectiveness of recruitment and selection processes. The results demonstrate that AI technology improves the traditional recruitment process and enables data-driven hiring decisions that improve personnel quality. Expert systems provide organized insights, big data analytics discover patterns and candidate behaviors, chatbots improve interactions, and machine learning optimizes selection criteria based on anticipated performance and supporting managerial decision-making and improving the quality of human capital outcomes in the telecommunications sector.

Keywords: Artificial Intelligence, Human Resource Management, Natural Language Processing, Human Computer Interaction, Optical Character Recognition

1. Introduction

Artificial intelligence (AI), or machine intelligence, denotes the manifestation of intelligence displayed by machines, in contrast to the natural intelligence found in people and other living entities (Abdeldayem & Aldulaimi, 2020). AI research is the study of "intelligent agents," which denotes any system capable of recognizing its environment and executing actions that enhance the probability of achieving its goals. (Ahmed, 2018).The domain of Human Resource Management (HRM) has lately integrated AI technologies, yielding diverse outcomes (Strohmeier & Piazza, 2015). The deployment of AI has

demonstrated benefits in numerous HRM functions, such as candidate sourcing, resume collection, staff scheduling, turnover forecasting, HR sentiment evaluation, and employee self-service. Jia, Guo, Li, Li, and Chen (2018) thoroughly examined the application of AI in human resources (HR). The researchers examined the utilization of HR AI across different fields, including strategic planning, recruitment, talent development, performance assessment, compensation management, and employee relations. AI has been progressively employed in HRM to streamline processes such as applicant sourcing, screening, interviewing, talent management, and employee learning initiatives (Oracle, 2019; Rodney, Valaskova, & Durana, 2019).

An analysis of automation technologies in HRM (Castellacci & Vias-Bardolet, 2019) indicates a persistent gap in understanding the impact of AI-enabled HRM activities on employees, their job results, and overall organizational performance.

However, an efficient AI application framework is absent in HRM research. This study seeks to address this gap by examining the impact of AI applications on the effectiveness of recruitment and selection processes in telecommunications Enterprises.

2.Research aim and objectives

The aim of this research study is to explore the role of AI Applications in the effectiveness of recruiting and selection in

telecommunication Enterprises, The following Objectives will be pursued to complete the research project: identify the range of artificial intelligence applications used in Recruiting and Selection in telecommunications enterprises, examine the impact of artificial intelligence applications on the effectiveness of Recruiting and Selection and propose recommendations for telecommunications enterprises to enhance and optimize the effectiveness of artificial intelligence applications in human resources management.

3. Research Problem & Questions

The current business environment is experiencing a rapid transformation in the application of AI technology, which has directly impacted human resource operations, especially in recruitment and selection. Despite the considerable potential of AI applications, concerns exist over their effectiveness in enhancing hiring processes within firms, particularly in the technology-dependent telecommunications sector. Accordingly, the research problem lies in understanding the impact of AI applications **(expert systems, big data analytics, chatbots, and machine learning**) on the efficiency and effectiveness of recruitment and selection processes in telecommunication companies in the Arab Republic of Egypt, so that the following study questions (RQs) are examined as follows:

- Q1: what are the artificial intelligence applications used in Recruiting and Selection in telecommunications enterprises?

- Q2: What is the role of AI Applications in the effectiveness of Recruiting and Selection in Telecommunication Enterprises?

4. Theoretical Background of Research

This study contributes to the understanding of applying AI Applications on HRM in Telecommunication Enterprises by providing comparative analysis across diverse Stages.it also enhances the theoretical Frameworks on AI Applications on HRM as well as linking AI Applications to HRM in telecommunication Enterprises. The findings indicate that AI technology automates the conventional recruitment process and facilitates data-driven hiring decisions that enhance the quality of hires. Expert systems deliver structured insights, big data analytics reveal patterns and candidate behaviors, chatbots enhance interactions, and machine learning refines selection criteria based on predicted performance.AI implementations mitigate human bias, accelerate operational efficiency, and improve the overall applicant experience.

4.1 Theoretical Background of AI Applications

The history of AI traces back to earlier times, where the concept of creating intelligent machines and automata captured the imagination of scholars and philosophers. However, the formal development of AI as a field of study began in the mid-20th century. Illustrating down the transformation of AI through time as shown below:

Table No. (1) Stages of the transformation of AI through time
Source (Russell, et.al,2021)

Stage Time	Stage Name	Summary
(1943–1955)	The gestation of artificial intelligence	• In 1943, Warren McCulloch and Walter Pitts established the foundation for artificial intelligence (AI) by introducing a model of artificial neurons grounded in neural physiology, propositional logic, and Turing's computational theory. • In 1950, Marvin Minsky and Dean Edmonds constructed the inaugural neural network computer, SNARC, illustrating the possibility of simulating neural networks. • Alan Turing's seminal vision of artificial intelligence, articulated in his 1950 article, included concepts including the Turing Test, machine learning, genetic algorithms, and reinforcement learning.
1956	The birth of artificial intelligence	• In 1956, John McCarthy held a workshop to investigate the possibilities of artificial intelligence, suggesting that robots could model characteristics of human intelligence, including language utilization, problem-solving, and self-enhancement.
1958–1969	Early enthusiasm, great expectations	• In 1958, John McCarthy developed the initial comprehensive AI system intended to encapsulate general knowledge of the world. • The Stanford AI Lab, established by McCarthy in 1963, focused on general-purpose methodologies for logical thinking by illustrating the combination of logical reasoning and physical action.
1969–1979	Knowledge-based systems: The key to power	• The expansion of practical applications in AI has led to diverse knowledge representation and reasoning languages, such as logic-based languages like Prolog and structured methodologies like frames, influenced by Minsky's research.
1980	AI becomes an industry	• The AI business witnessed exponential expansion, escalating from several million dollars in 1980 to billions by 1988, with numerous companies creating expert systems, vision systems, robotics, and specialized software and hardware. • In 1981, Japan launched the "Fifth Generation" project, with the objective of creating intelligent computers utilizing Prolog. The United States established the Microelectronics and Computer Technology Corporation (MCC) to enhance national competitiveness, incorporating AI, chip design, and human-interface research.

1995	The emergence of intelligent agents	• Intelligent agents have gained popularity in Internet applications, with AI technology supporting tools like search engines, recommender systems, and website aggregators. • The development of full agents has prompted the reconsideration of AI subfields, especially regarding the management of uncertainty from sensory systems, and has strengthened interactions with disciplines like as control theory and economics.
2001–present	The availability of very large data sets	• Recent advancements in AI indicate a transition in focus from algorithms to data for addressing numerous challenges, driven by the growing accessibility of extensive data sources, including text corpora, pictures, and genomic sequences.

According to previous studies there are various definitions of AI, it is defined as the ability of an artificial entity to solve complicated problems using its own intelligence.

AI seeks to enable computers to emulate human behavior in a much-reduced timeframe compared to human capabilities. Consequently, it is referred to as artificial intelligence. AI focuses on advancing practical informatics to develop systems that are adaptable, versatile, and capable of generating their own analytical and solution methodologies by applying general knowledge to specific contexts. (M., Kumar, R., & Mehta, D. 2023)

AI is the scientific and engineering discipline focused on the theory and practice of creating systems that demonstrate traits associated with human intelligence, including perception, natural language processing, problem-solving, planning, learning and adaptation, and environmental interaction. (Gheorghe Tecuci, 2012)

AI is the ability of a machine or computer system to simulate and perform tasks that would normally require human intelligence, such as logical reasoning, learning, and problem solving (Bartneck et al., 2021).

AI is an academic discipline including developments and advancements that enable computers, machines, and other entities to exhibit human-like intelligence, defined by cognitive functions, learning, adaptability, and decision-making abilities (Chen et al., 2020).

AI denotes a comprehensive category of technologies enabling computers to execute tasks often requiring cognitive abilities, such as adaptive decision-making (Tambe et al., 2019). Based on the previous definitions, AI can be characterized as a discipline that employs multiple approaches, including Machine Learning, Natural Language Processing, and expert systems, to enhance processes across diverse industries.

Various studies have aimed to determine different aspects of AI that can be used in different administrative work, and classify AI Applications in different perspectives as the following: -

- **Computer Vision** involves analyzing images through AI to make decisions. This can be conducted through scenes that are reconstructed. To do this, real-time as well as interactive images are used. Motion analysis can be conducted to

analyze how events take place. Images can be restored using computer devices.

This enables images to be recognized in order so that they can be processed (vanessa Raten 2024).

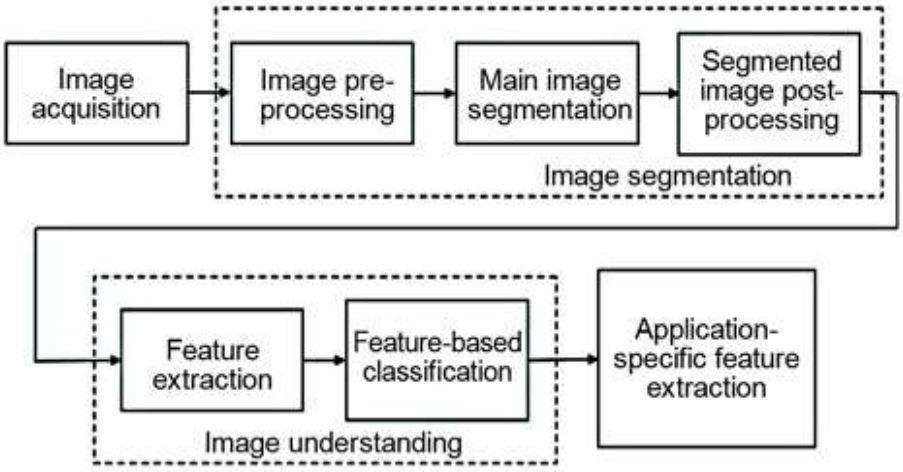


Fig4.1Computer Vision Figure

- **Natural Language Processing** is a computer program that processes human and not computer language, Natural language processing can be text- or speech-based, it involves simulating the linguistic capabilities of a human through artificial intelligence. It is used to do tasks such as playing music or providing other real-time information. Currently, many artificial intelligence systems are producing intelligent results but are not surpassing human-level behavior. This is because they are using knowledge from data and other information that can be processed through computers. (S, Haripriya & L C, Manikandan 2020)

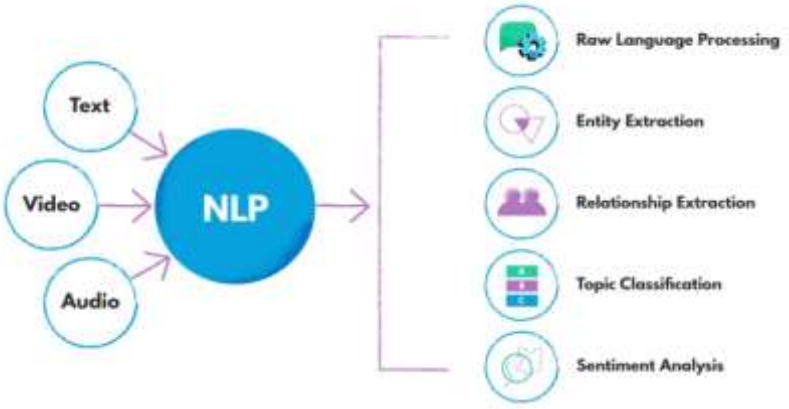


Fig 4.2 NLP Figure

- **Chatbots** A chatbot is an artificial intelligence program and a Human–computer Interaction (HCI) model (Bansal & Khan, 2018). According to the dictionary, a chatbot is "A computer program designed to simulate conversation with human users, especially over the Internet."(Chatbot |Definition of chatbot in English by Lexico Dictionaries, 2019).
  It uses Natural Language Processing (NLP) and sentiment analysis to communicate in human language by text or oral speech with humans or other chatbots (Khanna et al., 2015), Artificial conversation entities, interactive agents, intelligent bots, and digital assistants are also known as chatbots
- **Big Data Analytics** Zikopoulos and Eaton (2011) characterized big data as an aggregation of extensive data collections that cannot be managed using conventional database technologies, Manyika et al. (2011) characterize big

data as 'datasets that greatly exceed the capacity of conventional database software tools to gather, store, manage, and analyze'.

These definitions underscore the difficulties individuals encounter while analyzing massive data. On the other hand, particular academics characterize extensive data by its attributes. According to Gantz and Reinsel (2011, pp. 9–10), big data is characterized as an innovative variety of technologies and architectures aimed at economically deriving value from extensive volumes of diverse data through the facilitation of rapid capture, discovery and/or analysis. They identify four fundamental characteristics of big data: volume, diversity, velocity, and value. Their '4Vs' are widely recognized as the fundamental characteristics of big data. Forfás, Ireland, and the Expert Group on Future Skills Needs (2014) employ parallel dimensions (volume, diversity, and velocity) to differentiate between big data.

Volume denotes the magnitude of data, velocity signifies the rate of data change, and diversity pertains to the multiple formats and various applications and analytical methods of the data.

- **Machine Learning** Apell and Eriksson (2023, p. 180) state machine learning ‘refers to computer learning without being explicitly programmed’. Machine learning can be used to achieve artificial intelligence as it simulates the artificial

neural network architecture that occurs in the human brain. The idea of machine learning is that it learns from new information, thereby generating new thought patterns (Shaikh et al., 2022). Like the human brain, machine learning allows for complex patterns to develop that lead to new outcomes. The main types of machine learning are supervised, unsupervised, reinforcement and deep (Abioye et al., 2021). Supervised machine learning involves enabling machines to learn based on desired information. Unsupervised learning involves machines learning based on unstructured data sets. This is more difficult to do but can be achieved through clustering techniques, Reinforcement learning involves machine learning based on the analysis of data through rewards or reinforcements. It involves understanding the global business environment and how entities interact.

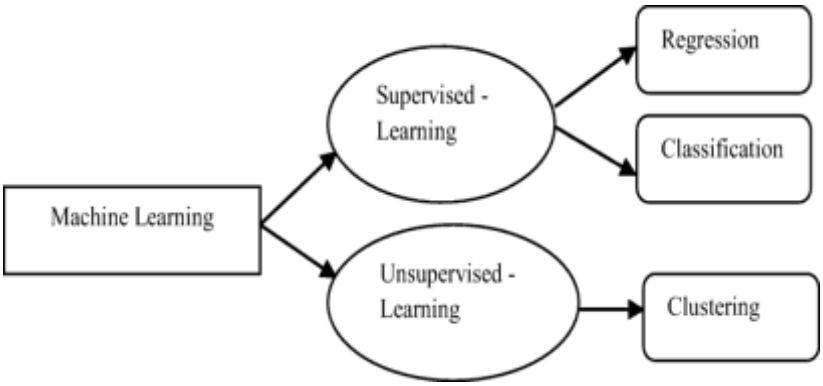


Fig 4.3 Machine Learning

- **Expert Systems** involve artificial intelligence based on existing knowledge. This means decisions are made based on inferring information based on the storage of knowledge. Knowledge can come in a variety of formats, including documented cases or experiences. Machines utilizing knowledge-based systems have a large depository of information that is continually added to. The main types of knowledge-based systems are expert systems, intelligent agents, case-based reasoning and linked systems (Abioye et al., 2021).

4.2 Theoretical Background of Recruiting and Selection

As internet usage expands, mobile applications and active social media users are rising, prompting organizations to integrate their business processes. The gap in expectations between employees and employers has led to diverse applications in human resources.

The phrase "human resource management" (HRM) has been popular for ten to fifteen years. Previously, the domain was also commonly called "personnel administration." Human Resource Management has gone through multiple changes throughout history. The name adjustment mainly resulted from the evolution of social and economic activities over time. (Taslim Ahammad, 2017)

Personnel administration, which became a distinct discipline by the 1920s, primarily focused on the technical aspects of

recruitment, assessment, training, and compensation of employees. It functioned mainly as a "staff" role inside most firms. The field typically did not emphasize the correlation between varied employment practices and overall organizational performance or the systematic interrelations among these practices. The discipline also lacked an integrated framework. (Taslim Ahammad, 2017)

The field of HR management emerged in response to the significant rise in competitive pressures faced by business enterprises starting in the late 1970s, driven by globalization, deregulation, and rapid technical advancements. These pressures led to increased concern among firms to undertake strategic planning process of forecasting future changes in environmental conditions (both the nature and level of the market) and aligning the various components of the organization to enhance organizational effectiveness. (Taslim Ahammad, 2017)

The HRM function of an organization emphasizes the human aspect of management. It encompasses techniques that assist the business in managing its personnel efficiently across the several stages of the employment cycle, including pre-hire, staffing, and post-hire. The pre-employment phase encompasses strategic planning activities. The firm needs to determine the types of job openings available in the coming months and identify the required requirements for these positions. In the recruitment

process, the organization identifies and picks its personnel. Selection methods encompass the recruitment of candidates, evaluation of their qualifications, and the final choice of those considered most qualified. (Whatishumanresource.com, 2017)

The most complex type of digital HRM includes changing organizations' human resources management functions. Digital HRM is transitioning from traditional concentration points toward knowledge, automation, and transformation. Consequently, implementing digital HRM has become imperative for all organizations today, requiring a redefinition of human resource protocols.

Deloitte (2018) presents the evolving regulations of human resources in the following table:

Table No (2) Changing rules of human resources Source (Deloitte, 2018).

Old rules of human resources management	New rules of human resources management
HR departments focus on process design and integration to create standard HR applications.	HR departments focus on optimizing employee productivity and commitment and teamwork.
HR chooses ready-to-use applications to track the system with the cloud computing system. It uses the cloud management model.	HR creates software programs that follow the learning process from an innovative perspective and develop new applications.
HR technology teams focus on integrating ERP applications.	The HR technology team focuses on developing digital capabilities, competencies and mobile applications aimed at “productivity at work”.

HR excellence centers focus on process design and process excellence. Process management ensures the correct structuring of human resources functions.	HR excellence centers take advantage of chat applications and other advanced technologies to evaluate and strengthen employees. It is expected that the number of messaging applications will increase
HR programs are designed to meet and maintain scale requirements worldwide	HR programs create career maps related to careers and career management by targeting employee profiles.
HR focuses on "self-service" as a way to scale services and support.	HR focuses on "activity" to help people do things in more efficient and productive ways
HR creates a "self-service portal" that runs as a technology platform that makes it easier to find process requirements and schedules.	HR creates an integrated "employee experience platform" using digital applications, case management, AI and bots to support continuous employee needs.

Recruitment involves identifying the talents required by the firm and assessing the associated recruiting costs before starting the recruitment process. Depending on the organization's operating requirements, recruitment may occur outside or internally to attract and appoint candidates on a temporary, fixed-term, or permanent basis (Nielsen, 2015). The selection process involves screening and selecting candidates whose qualifications, experience, abilities, and expertise align with the requirements of the announced position. The selection process uses relevant HR tools and methodologies to identify an appropriate candidate for the open position. (Kumari, 2012)

The recruitment process, an essential part of the system, involves examining and screening resumes, interviewing individuals, and

aligning them with appropriate roles. Artificial intelligence can recognize the criteria for successful employees in specific roles and utilize this understanding to identify suitable applicants and evaluate their performance. (Hewage, A. 2023)

Initially, Optical Character Recognition (OCR) is employed to recognize paper resumes and images, or the big data approach is utilized to filter electronic resumes. This process involves analyzing resumes, integrating the attributes of resumes with text information extraction techniques, and conducting matching, correlation analysis, and statistical analysis. The database can be transformed into a structured resume within seconds and promptly submitted to the organization with precision. Simultaneously, by analyzing resumes and job compatibility, the system can suggest appropriate employment to individuals, particularly for highly qualified professionals. In this procedure, AI can evaluate applicants impartially (Hutson, 2017).

Albert, E. T. (2019) shows that job description optimization software offers recommendations to enhance job descriptions and customize the language for various candidate types. Enhanced diversity Mitigates the possibility of indirect discrimination and enhances candidate involvement.

Moreover, Son, M., Lee, H., & Chang, H. (2019) indicated that AI interviews comprehensively report applicant traits derived from games and surveys. This report outlines the applicant's

proficiency in positivity, passion, cognitive ability, emotional intelligence, and workplace maladjustment. It also forecasts the applicant's potential excellence using a model derived from data on outstanding performers in the field.

Face recognition algorithms can be employed during the examination to verify the candidate's identity against the provided documentation, deterring impersonation (Jain & Li, 2011).

Implementing natural language processing technology eliminates the need for typing, and the transformation from speech to text is rapid, significantly enhancing the efficiency and precision of the recruiter's tasks. Furthermore, the system may select a suitable interviewer by employing the voice assessment approach to facilitate efficient recruitment. (Hemalatha et al., 2021)

Afterward, the big data methodology is employed to gather candidate information, assess job vacancies, link interview outcomes of selected individuals, analyze their personality traits, strengths and weaknesses, and align them with suitable positions through evaluating personality and IQ/EQ assessments. AI assists managers in identifying new personnel with the highest potential for success and positioning them in appropriate teams. (Allal-Chérif et al., 2021)

5. Research hypothesis and framework

Based on the research aim & the problem statement, the following hypothesis can be formulated:

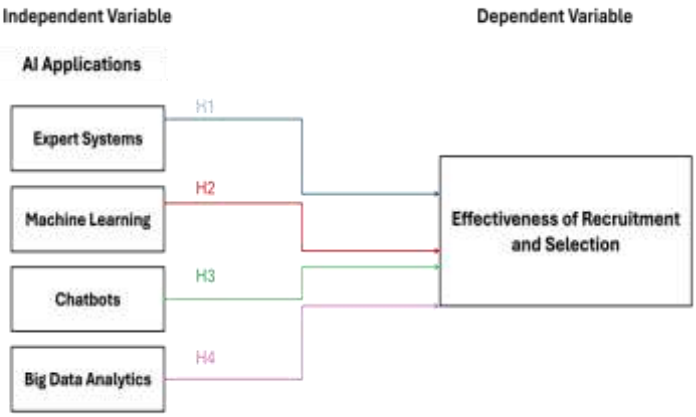
The Hypotheses of the research

First Hypothesis: The Expert systems as an AI Applications for HR Department in Telecommunication Enterprises is positively influence the Effectiveness of Recruitment and Selection Functions

Second Hypothesis: The Machine Learning as an AI Applications for HR Department in Telecommunication Enterprises is positively influence the Effectiveness of Recruitment and Selection Functions

Third Hypothesis: The Chatbots as an AI Applications for HR Department in Telecommunication Enterprises is positively influence the Effectiveness of Recruitment and Selection Functions

Fourth Hypothesis: The Big Data Analytics as an AI Applications for HR Department in Telecommunication Enterprises is positively influence the Effectiveness of Recruitment and Selection Functions



6. Research Methodology

6.1 Research Design

A quantitative methodology was selected for the study based on its' ability to examine relationships. Earlier studies of Artificial Intelligence in Human Resources Management have been conducted using quantitative methodology, supporting the study's research questions and the ability of the variables to identify relationships, The quantitative data will be gathered through a questionnaire which designed to measure the impact of Artificial Intelligence applications on the effectiveness of Recruiting and Selection Functions in telecommunications enterprises in Egypt.

6.2 Population and Sampling

The population for this research will be employees and managers of Human Resources management department in telecommunications enterprises in Egypt. (Vodafone, WE, Etisalat, Orange), the population size can be illustrated in the following table.

The Telecommunication Enterprise	No of HRM Specialists and Managers
Etisalat	90
WE	345
Vodafone	104
Orange	96
Total Population	**635**

Table no (3) Research population

Source: The table has been prepared using the data collected from HRM Department in the Telecommunication Enterprises.

To calculate the sample size based on the population size (or statistical population), the following equation can be used, which takes into account the confidence level, margin of error, and the proportion of the population likely to have the characteristic being measured:

$$n = \frac{N \cdot Z^2 \cdot p \cdot (1-p)}{E^2 \cdot (N-1) + Z^2 \cdot p \cdot (1-p)}$$

Where:

- **n**: The required sample size.

- **N**: The population size (number of individuals in the population).
- **Z**: Z-value for the desired confidence level (e.g., for a 95% confidence level, Z = 1.96).
- **p**: The estimated proportion of the population that has the characteristic being measured (if uncertain, you can use 0.5, as this gives the largest sample size).
- **E**: The acceptable margin of error (e.g., 0.05 for a 5% margin of error).

For a population size of 635, applying the formula with a 95% confidence level and a 5% margin of error, the required sample size is approximately **240 individuals**, we will illustrate the distribution of the sample according to the relative importance of telecommunication enterprises population size.

The Telecommunication Enterprise	No of HRM Specialists and Managers	Relative Importance	No of distributed Surveys
Etisalat	90	14%	13
WE	345	54%	186
Vodafone	104	16%	17
Orange	96	16%	24
Total Population	**635**	**100%**	**240**

Table no (4) The distribution of Research Sample

Source: Based on Researcher Preparation

7. Data Analysis and testing hypothesis

The analysis begins with a descriptive overview of the demographic characteristics of the respondents and proceeds to evaluate the reliability and validity of the measurement instruments. Next, inferential statistical techniques, including correlation and regression analysis, are employed to investigate the direct effects of AI Applications and The Effectiveness of Recruiting and Selection Functions.

7.1 characteristics of the study sample

The distribution of the study sample by gender, and the results indicate that the sample was 54.2% male and 45.8% female, demonstrating a slightly higher representation of males than females. The distribution is relatively balanced, enhancing gender equality in the analysis. This distribution contributes to providing a comprehensive view of the opinions or characteristics under study without significant bias toward one gender.

The results indicate that most participants fall into the age groups of 20 to 30 (40.4%) and 30 to 40 (36.7%), meaning that approximately 77.1% of the sample is between the ages of 20 and 40. This percentage reflects that the sample is primarily composed of young and mature individuals, the most active segment of society.

These results indicate that most of the sample members have a high level of education, with approximately 80% holding university or postgraduate degrees. This reflects the presence of an educated

and informed segment within the sample, enhancing the quality of the data extracted from the study and contributing to a deeper understanding and analysis of the trends or opinions studied.

The majority (approximately 83.7%) have less than 10 years of experience, indicating that the sample represents a new to intermediate-experienced professional group.

7.2 Reliability and validity

The researcher paid great attention to verifying the reliability and validity of the scale. Reliability of the scale means "the ability of the scale to give the same scale scores if it is reused after a limited period of time by the same individual. Validity of the scale also means" ensuring that the questionnaire will measure what it was designed to measure, i.e. the questionnaire includes all the elements that should be included in the analysis on the one hand, and the clarity of its paragraphs and vocabulary on the other hand, so that it is understandable to everyone who uses it (Obeidat, 2001: 179). The value of the reliability scale and the value of the validity scale can be explained as the reliability coefficient = the square root of the reliability coefficient of the scale. See: (Abdul Hamid Al-Abbasi, Statistical Analysis Using Spss, Cairo: without publisher, 1999, pp. 56, 57.)

Table 5 displays the results of the reliability and validity coefficient for the dimensions of the relationship between AI Applications and The Effectiveness of Recruitment and Selection Process in Telecommunication Enterprises.

Table (5) Reliability Statistics

Variables	construct	name	N of Items	Cronbach's Alpha	Validity
Artificial Intelligence Technologies	Artificial Intelligence Technologies (Expert Systems)	X1	7	0.922	0.960
	Artificial Intelligence Technologies (Machine Learning)	X2	9	0.953	0.976
	Artificial Intelligence Technologies (Chatbots)	X3	7	0.898	0.948
	Artificial Intelligence Technologies (Big Data Analysis)	X4	5	0.799	0.894
Artificial Intelligence Applications		X	28	0.964	0.982
	Effective Recruitment and Selection Process	Y	8	0.893	0.945

Source: SPSS v25 output.

Analyzing the reliability and validity statistics in the previous table shows that the measurement tools used in the study have a high degree of reliability and validity. All dimensions of AI technologies, including expert systems, machine learning, chatbots, and big data analysis, showed high Cronbach's alpha values, indicating high reliability. For example, machine learning recorded the highest reliability value of 0.953, reflecting strong internal consistency for this dimension.

the effectiveness of Recruitment and Selection Process indicating a high degree of internal consistency 0.893, This high value reflects the general reliability of the measurement tools used in the study, enhancing the researcher's confidence in the results obtained.

7.3 Descriptive statistics for study variables

Below we discuss the descriptive statistical measures of the research variables, where the data in the tables for these dimensions show the statements that received the highest degrees of agreement and the lowest degrees of agreement according to the responses of the study sample items, then the general trend of the research item responses is shown for each dimension. Considering the percentage of the coefficient of variation, which (its equation is as follows = standard deviation ÷ arithmetic mean × 100). So, the next table show Descriptive analysis for AI Applications.

Table (6) Descriptive analysis for AI Applications

items	Std. Deviation	Mean	coefficient of variation	Rank
X1_1	0.893	3.650	24.47%	3
X1_2	0.956	3.650	26.19%	3
X1_3	0.961	3.570	26.92%	5
X1_4	0.867	3.730	23.24%	2
X1_5	0.907	3.570	25.41%	5
X1_6	0.874	3.740	23.37%	1
X1_7	0.962	3.560	27.02%	7
Artificial Intelligence Technologies (Expert Systems)	0.757	3.638	20.82%	2

Table (6) Descriptive analysis for AI Applications

items	Std. Deviation	Mean	coefficient of variation	Rank
X2_1	0.937	3.480	26.93%	8
X2_2	0.911	3.580	25.45%	7
X2_3	0.874	3.620	24.14%	6
X2_4	0.894	3.640	24.56%	4
X2_5	0.866	3.640	23.79%	4
X2_6	0.832	3.750	22.19%	1
X2_7	0.871	3.750	23.23%	1
X2_8	0.889	3.670	24.22%	3
X2_9	0.923	3.470	26.60%	9
Artificial Intelligence Technologies (Machine Learning)	0.721	3.622	19.91%	3
X3_1	0.896	3.590	24.96%	5
X3_2	0.900	3.600	25.00%	3
X3_3	0.963	3.540	27.20%	7
X3_4	0.933	3.590	25.99%	5
X3_5	0.866	3.670	23.60%	2
X3_6	0.967	3.600	26.86%	3
X3_7	0.808	3.740	21.60%	1
Artificial Intelligence Technologies (Chatbots)	0.714	3.617	19.75%	4
X4_1	0.834	3.680	22.66%	4
X4_2	0.826	3.770	21.91%	2
X4_3	0.817	3.760	21.73%	3
X4_4	0.754	3.800	19.84%	1
X4_5	0.868	3.500	24.80%	5
Artificial Intelligence Technologies (Big Data Analysis)	0.611	3.703	16.50%	1
Artificial Intelligence Applications	0.620	3.645	17.02%	-

The previous table shows the following:

- Expert systems showed an overall mean of 3.638 with a standard deviation of 0.757, indicating that the data is homogeneous. The highest mean value was for item X1_6 (3.740), while the lowest mean value was for item X1_7 (3.560). The coefficient of variation (CV) was 20.82%, reflecting a moderate degree of variability among the data.
- Machine learning recorded an overall mean of 3.622 with a standard deviation of 0.721. The highest mean value was for items X2_6 and X2_7 (3.750), while the lowest mean value was for item X2_9 (3.470). The coefficient of variation was 19.91%, indicating good homogeneity of the data.
- Chatbots: The overall mean for chatbot technologies was 3.617 with a standard deviation of 0.714. The highest mean value was for item X3_7 (3.740), while the lowest was for item X3_3 (3.540). The coefficient of variation was 19.75%, reflecting good data homogeneity.
- Big Data Analysis showed the highest overall mean of 3.703 with a standard deviation of 0.611, indicating high data homogeneity. The highest mean value was for item X4_4 (3.800), while the lowest was for item X4_5 (3.500). The coefficient of variation was 16.50%, reflecting a high degree of homogeneity.
- The overall mean for AI applications was 3.645 with a standard deviation of 0.620. The coefficient of variation was

17.02%, indicating that the data is generally homogeneous. These results indicate that different AI applications have a high degree of data homogeneity.

Table (7) Descriptive analysis for Effective Recruitment and Selection

items	Std. Deviation	Mean	coefficient of variation	Rank
Y1_1	0.879	3.700	23.76%	4
Y1_2	0.849	3.700	22.95%	4
Y1_3	0.877	3.510	24.99%	8
Y1_4	0.831	3.730	22.28%	3
Y1_5	0.846	3.670	23.05%	7
Y1_6	0.785	3.850	20.39%	1
Y1_7	0.872	3.680	23.70%	6
Y1_8	0.778	3.850	20.21%	1
Effective Recruitment and Selection	0.635	3.711	17.11%	1

Source: SPSS v25 output.

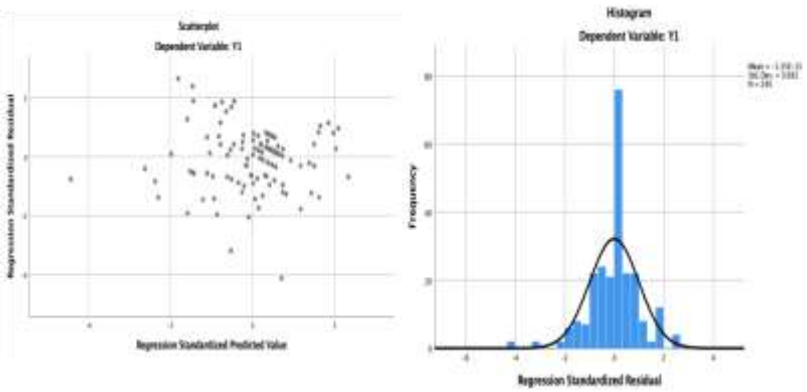
The previous table shows that the overall mean for this process was 3.700 with a standard deviation of 0.879. The highest mean value was for items Y1_6 and Y1_8 (3.850), while the lowest mean value was for item Y1_3 (3.510). The coefficient of variation (CV) was 23.76%, reflecting a moderate degree of variability among the data.

7.4 Discussion results of the Research hypotheses

To test the study hypothesis The AI Applications for Human Resources department in Telecommunications enterprises positively influence the effectiveness of Recruiting and Selection,

a quality test of the study model is conducted to ensure the quality of the model outputs, as many tests were conducted, then the results of the measurement models are displayed.

Figure (2) normal distribution for hypothesis residuals



The results of the figure include two plots to evaluate the residuals of the regression model related to the dependent variable Effective Recruitment and Selection Process (Y1), The results of the first plot, Scatterplot, show that the points are randomly distributed around the horizontal axis without a clear pattern, indicating that there are no major problems in the regression model. The second plot, Histogram, shows the distribution of the standard residuals, with a normal curve line to illustrate the extent to which the distribution of the residuals matches the normal distribution. The plot shows that the mean of the residuals is close to zero, and the standard deviation of the residuals is approximately 1, which supports the validity of the assumptions associated with the regression model.

Table (8) Results of the multiple regression

variables	B	t-test	Sig.	Collinearity Statistics	
(Constant)	1.458	6.922	0.000	Tolerance	VIF
Expert Systems (X1)	0.319	4.141	0.000	0.322	3.104
Machine Learning (X2)	0.067	2.713	0.006	0.239	4.179
Chatbots (X3)	0.101	2.26	0.009	0.332	3.014
Big Data Analysis (X4)	0.46	6.101	0.000	0.516	1.937
	R	R Square	Durbin-Watson	f-test	Sig.
	0.783	0.613	1.746	33.229	.000b
a Dependent Variable: Recruitment (Y1)					

Source: from SPSS v25 output.

The results of the previous table show that the values of the variance inflation factor ranged between (1.937 to 4.179) which is less than 5, indicating that there is no problem of collinearity, which means that the independent variables are not significantly correlated, while the Durbin-Watson test indicates the verification of the independence of the model residuals, and its value reached (1.746) and the values between (1.2 to 2.5) are considered appropriate and indicate that there is no significant autocorrelation between the residuals.

The value of the correlation coefficient reached (0.783), indicating a moderate correlation between the independent variables and the dependent variable, while (R2) represents the percentage of variance in the dependent variable explained by the independent variables, and is (0.613), which is greater than 30%, indicating the strength of the independent variables' explanation

of the dependent variable, which means that about 61.3% of the variance in the Effective Recruitment and Selection Process is explained by the Artificial Intelligence Technologies dimensions (Expert Systems - Machine Learning – Chatbots - Big Data Analysis).

The multiple regression equation can also be extracted as follows:

$$\text{Recruitment } (y) = 1.458 + 0.319\ X1 + 0.067\ X2 + 0.101\ X3 + 0.46\ X4$$

We conclude from the previous equation the following:

- Big Data Analysis showed the highest impact among all variables, with a coefficient of 0.460, indicating that the use of data analysis techniques significantly contributes to improving recruitment processes by providing deeper and more accurate insights into candidates. Therefore we accepted the fourth hypothesis that state "the big data analysis as AI Application is positively influence the effectiveness of recruitment and Selection.
- Expert Systems followed in this impact, with an impact coefficient of 0.319, reflecting the role of these systems in supporting decision-making and improving the accuracy of assessment during the recruitment process. This demonstrates that relying on expert systems enhances the efficiency of selecting suitable candidates. Therefore we accepted the first

hypothesis that state "the Expert Systems as AI Application is positively influence the effectiveness of recruitment and Selection.

- Chatbots recorded an impact coefficient of 0.101, a positive but relatively smaller effect, indicating that their use contributes to improving initial interaction with applicants and increasing communication efficiency. However, their impact is less than that of other tools in improving the final hiring decision. Therefore we accepted the third hypothesis that state "the Chatbots as AI Application is positively influence the effectiveness of recruitment and Selection.
- Finally, Machine Learning had an impact coefficient of 0.067, the lowest of the four variables, but it remains statistically significant. This suggests that machine learning technologies play a role in supporting recruitment processes, but to a lesser extent than other applications. This may be due to the level of their actual application or the complexity of their use in HR environments. Therefore we accepted the Second hypothesis that state "the Machine Learning as AI Application is positively influence the effectiveness of recruitment and Selection.

Also, the value of the F test reached (33.22) with a statistical significance value of (0.00) at a significance level less than 0.01, which indicates that the estimated study model is acceptable and valid for prediction, and therefore we accepted The main

Hypothesis , which states that "The AI Applications for Human Resources department in Telecommunications enterprises positively influence the effectiveness of Recruiting and Selection"

8. The conclusion & research Recommendations

This study examined the critical role of Artificial Intelligence (AI) in improving the recruitment and selection processes within telecommunication organizations in Egypt. Based on a quantitative analysis of 240 HR practitioners, it identified multiple uses of AI, including expert systems, big data, chatbots, and machine learning, which positively influence the efficiency and accuracy of hiring operations.

The findings indicate that AI technology automates the conventional recruitment process and facilitates data-driven hiring decisions that enhance the quality of hires. Expert systems deliver structured insights, big data analytics reveal patterns and candidate behaviors, chatbots enhance interactions, and machine learning refines selection criteria based on predicted performance.

AI implementations mitigate human bias, accelerate operational efficiency, and improve the overall applicant experience. Consequently, businesses are converting HR tasks from conventional duties to strategic operations. However, successful implementation requires Strategic planning, employee training,

and data protection measures are prerequisites for effective execution. Organizations must guarantee AI's ethical and transparent application while developing internal competencies to oversee and assess its effects.

Implementing AI in recruitment is both a technological advancement and a strategic imperative for telecommunications companies seeking a competitive edge in the digital age.

From the results of the research we can suggest some recommendations, as follows:

- Allocate a yearly budget for developing and utilizing AI technologies in recruitment, including expert systems and machine learning.
- Develop an internal recruitment chatbot to engage with applicants, address common inquiries, and gather preliminary information cost-effectively.
- Organize quarterly training sessions for recruitment teams on the effective use of AI technology and the interpretation of its outcomes.
- Establish Key Performance Indicators (KPIs) to evaluate AI technologies' efficacy throughout each recruitment process phase.
- Develop internal machine learning models to analyze the performance patterns of existing employees and utilize these patterns to attract similarly high-potential candidates.

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