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The Importance of Artificial Intelligence
in Economic Decision-Making in Egypt

Introduction:

Artificial intelligence is defined as "the means by which humans assist in solving various problems with the aim of development and simplifying daily affairs, thus saving time, effort, and money. AI is capable of making machines function with human-like qualities and think in a way that allows them to meet requirements and facilitate decision-making quickly and intelligently, helping to achieve desired goals. Additionally, it can read languages, recognize images and drawings, and compare them with its existing database. AI can also consider alternatives and solutions to problems, addressing them within a short timeframe to prevent any potential harm caused by the risks faced" [1].

Artificial intelligence systems and applications focus on simplifying the decision-making process as it is fundamental to the progress and implementation of any project or action across various sectors that support national security, particularly political, economic, military, security, and environmental fields. Given the importance of decision-making in shaping the priorities of an institution or state, it is considered a continuous and permanent function that requires constant updates to smart applications, especially in a competitive environment based on technology to quickly seize opportunities [2].

This study will focus on the mechanism of economic decision-making and the need for AI to make decisions efficient and effective.

Study Problem:

The study revolves around the potential use of AI applications to support economic decision-making in light of the accelerating impact of external and internal variables on the quality and rationality of decisions, as well as determining the priorities of these decisions.

Study Objective:

To study and analyze the impact of applying and using AI in economic decision-making and the extent to which it can be utilized to achieve the highest levels of accuracy in achieving the desired objectives.

Study Questions:

1. What is artificial intelligence?
2. What is the concept of economic decision-making, its stages, and types?
3. What are the internal and external factors influencing economic decisions?
4. What is the impact of using AI in economic decision-making?
5. What are the advantages and disadvantages of using AI in economic decision-making?

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Study Methodology:

The descriptive method was used to clarify the nature of artificial intelligence, the concept of economic decision-making, and to describe the research problem in the context of the study. Additionally, the analytical method was used to illustrate the impact of AI in supporting and making economic decisions.

Contents of the Study:

1. The Conceptual Framework of the Study.
2. The Impact of Artificial Intelligence Application on Economic Decision-Making.
3. Study Results and Recommendations for Utilizing Artificial Intelligence in Economic Decision-Making.

First: The Conceptual Framework of the Study:

1. The Concept of Artificial Intelligence:

Artificial intelligence has several definitions, but they all converge on the concept of how machines or programs invented by humans interact and function with human-like intelligence. AI is the scientific and technical approach that includes methods and techniques aimed at creating algorithms capable of simulating human intelligence. It is often defined as a cognitive science rather than a technical science, due to its history, as it began with research in neural networks and mathematical logic before being categorized as a field of computer science [3].

2. Types of Artificial Intelligence:

AI can be categorized as follows [4]:

A. Narrow Artificial Intelligence (NAI)

B. General Artificial Intelligence (GAI)

C. Super Artificial Intelligence (SAI)

3. AI can also be classified based on the functions it performs, such as:

A. Reactive Machines

B. Limited Memory

C. Theory of Mind

D. Self-awareness

4. Generative Artificial Intelligence (Generative AI):

A. This field of AI aims to automatically create new and innovative content, rather than simply analyzing or using existing data. It can generate various types of content, such as text, images, sound, code, and more, making it appear as if created by humans [5].

B. According to the World Economic Forum in Davos, 2024, generative AI refers to AI algorithms that generate new outputs based on the data they have been trained on.

C. Generative AI differs from general AI in that it uses machine learning techniques and neural networks to automatically generate new and innovative content, such as images, text, and videos. In contrast, the term "artificial intelligence" (AI) refers to the broader field that encompasses all AI applications, including generative AI.

5. Components of Artificial Intelligence Related to the Decision-Making Process, Especially Economic Decision-Making:

A. Machine Learning (ML):

Machine learning is a branch of AI that enables computers to learn by themselves from previous experiences or data, through the repeated training of models (Model), allowing them to predict and make the appropriate decisions quickly. This is achieved through the development of algorithms that facilitate this process. The term was first introduced in 1995 by Arthur Samuel [6].
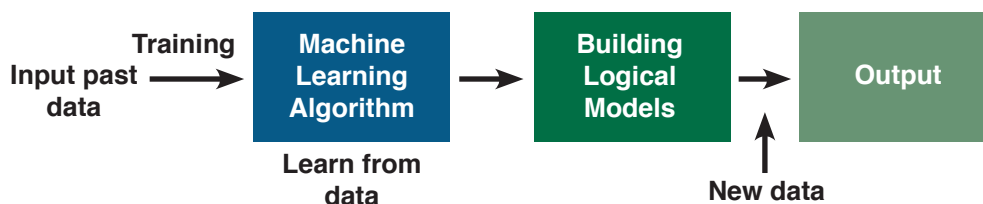
Machine Learning Model [7]

B. Data Mining:

- The term data mining refers to extracting knowledge from large volumes of data. The term is somewhat misleading because it focuses not on mining the data itself but rather on deriving valuable knowledge from the abundant available data akin to mining for gold in rocks, not the rocks themselves [8].

- There are four main categories of data mining:

  - Prediction tools

  - Classification (Clustering Analysis)

  - Clustering Analysis

  - Association Rules Discovery

C. Information Retrieval and the Semantic Web

Web Information Retrieval and Semantic Web involve searching for data and documents of any type that may exist across the web. The semantic web concept transforms the required web data into a global database interconnected for better machine understanding, making the information usable not only for humans but also for machines. For example, machines can now book tickets online, use online dictionaries, and more [9].

D. Knowledge Representation

Knowledge Representation in artificial intelligence focuses on enabling machines to think and make decisions. Knowledge acquired by machines is collected and stored in a database used for managing and exchanging knowledge, serving as a reference for making intelligent decisions [10].

E. Logical and Probabilistic Reasoning

Artificial intelligence reasoning relies on deducing and inferring facts from available data. Logical reasoning is complemented by probabilistic reasoning, which incorporates the concepts of probability and uncertainty in knowledge. This approach is designed to address all potential future scenarios characterized by ambiguity and uncertainty.

6. In January 2024, the World Economic Forum held in Davos, Switzerland, launched the AI Governance Alliance to promote global efforts for equitable access to AI technology and address the challenges and risks posed by advanced technologies[11].

7. AI Systems Enhancing Economic Decision-Making:

A. Expert systems

Expert systems model human expertise in specific knowledge areas to solve problems automatically through the following stages [12]:

- Investigation Stage: Decision-makers identify the need for a specific decision, whether routine or in response to a new problem or crisis. AI applications assess the severity of the problem using a knowledge base.

- Design Stage: Decision-makers develop alternative solutions, evaluating their pros and cons. AI tools play a critical role, employing analytical methods like SWOT, PESTEL, and Mapping during this phase.

- Selection Stage: Decision-makers choose among several alternatives, with expert systems suggesting and evaluating optimal solutions.

- Implementation Stage: The chosen solution is executed.

- Follow-up and Evaluation: Ongoing assessment supports the decision-making process.

B. Neural Networks

Neural networks play a vital role in describing human cognition and neurobiology, significantly aiding decision-making across various fields:

- Predicting Stock Market Trends, consumer behavior, and production cycles due to their ability to process large datasets intelligently and deliver swift, accurate reports [13].

- Production Planning and Quality Control, designing new products, and forecasting economic variables, enabling improved decision-making and efficiency.

C. Genetic Algorithms

Genetic algorithms are among the most significant tools that simulate biological processes to analyze problems in evolutionary systems. These algorithms are based on observing phenomena and are routinely employed to identify effective solutions [14]. Essentially, genetic algorithms are designed to develop and propose solutions for

problems involving multiple influential alternatives. They are also utilized to address issues related to logistics operations and resource management, and they find applications in modern technologies such as space technology and biotechnology, which support economic growth [15].

D. Intelligent Agents

• An intelligent agent is an electronic program designed to initiate actions or respond, wholly or partially, to data messages, tasks, or operations on behalf of its user without direct supervision, review, or intervention. In doing so, it demonstrates a high degree of flexibility, learning, adaptation, communication, and interaction with its user, environment, and other agents [16].

• Role in E-Commerce: With the widespread adoption of the internet and the exponential growth of e-commerce, coupled with the overwhelming flow of information, products, and services online, it has become increasingly challenging for users to find what they need efficiently. Intelligent agents are therefore employed to organize search tasks and simplify access, aiding users in making informed decisions [17].

• Key Characteristics of Intelligent Agents:

  - Autonomy

  - Ability to act (initiative) and react

  - Social interaction (communication with others)

  - Mobility

  - Precision and rationality

8. Decision-making:

Decision-making is a fundamental part of daily life, whether for simple or complex matters. It involves choosing among several proposed solutions to address a problem or perform a specific task to achieve a desired outcome [18].

9. The Nature of Economic Decisions

A. Economic decisions pertain to production and its requirements, investment in various fields, purchasing consumer goods, or export activities, all guided by well-studied priorities and plans that serve the interests of both the state and the private sector. These decisions also consider the importance of foreign partners and investors. They impact income levels and employment opportunities not only for those directly involved but also for others indirectly affected. For instance, building a factory benefits not only its owners and employees but also the surrounding community due to increased demand for local goods and services. Conversely, it may negatively impact workers in competing factories that cannot keep up, illustrating how all economic decisions, regardless of who makes them—be it private enterprises or public authorities—have broad implications [19].

B. Assessing such decisions is challenging for several reasons. For example, the benefits of a decision cannot always be measured purely in monetary terms or through opportunity cost analysis. Establishing training centers for workers, for instance, benefits the economy, but its impact is not immediate. Comparing the productivity of trained workers to their untrained counterparts and ensuring that the additional revenue generated by businesses employing these workers stems directly from their training not other factors requires careful evaluation.

C. The importance of leveraging AI in all stages of economic decision-making is underscored, especially as global trends shift toward a circular economy.

10. Stages of Economic Decision-Making[20]:

A. Economic decision-making involves several key stages: identifying and analyzing the problem, developing alternatives, evaluating those alternatives, selecting the best alternative and making the decision, and finally, monitoring and follow-up [21]. Artificial intelligence (AI) can significantly enhance and refine these stages by providing precise, data-driven insights and reducing reliance on subjective or personal preferences. Challenges in the Egyptian context and the structure of Egypt's economy amplify the impact of global economic shocks due to the low production levels which limit the country's capacity for exports and competitiveness in global markets, particularly in technology and heavy industries. Ongoing economic reforms are mandated by international institutions to secure economic support, impose severe burdens on Egyptian citizens. Sectors such

as tourism and the Suez Canal are intricately tied to global trade and mobility. Disruptions caused by crises such as COVID-19, the Ukraine war, and the ongoing conflict in Gaza have significantly affected these sectors. Changes in living standards, business activity, and spending habits in other countries further exacerbate challenges for Egypt's economy [22].

B. Given the absence of quick solutions to address Egypt's economic crisis, the process of making economic decisions—particularly those related to public expenditure priorities and development plans—becomes the most critical instrument for the state. These decisions are essential for navigating the crisis with minimal losses. Egypt is currently facing a complex crisis characterized by significant uncertainty. The primary challenges include a lack of clarity regarding how the situation will evolve and the timeframe for its resolution.

C. Measures to enhance economic decision-making in Egypt using Artificial Intelligence should be adopted [23]:

- abandoning speed and decisiveness as primary factors while economic decisions during crises are typically expected to be swift and decisive, the current situation is far from conventional. Egypt faces complex crises with no clear timeline for resolution and limited reliable information, often based on forecasts, assumptions, and scenario-building. Therefore, incorporating artificial intelligence (AI) in the decision-making process is essential to minimize human errors and personal biases as well as prioritize actions and conduct detailed comparisons with competitors to ensure well-informed decisions.

- avoiding involvement of non-experts in decision-making processes

- decisions should be rooted in institutional frameworks rather than being driven by individual discretion.

11. Methods of Economic Decision-Making Requiring the Integration of Artificial Intelligence:

A. Non-Quantitative Theoretical Methods: The most notable methods include [24]:

- **Facts:** Facts serve as a strong foundation for decision-making. Without them, reliance on assumptions complicates reaching accurate solutions using artificial intelligence (AI).

- **Personal Judgment:** This involves the decision-maker's ability to use wisdom and quick thinking to understand the problem and identify its key elements—an area where AI can provide support.

- **Experience:** The experience of the decision-maker, combined with that of their team, plays a crucial role in determining suitable decisions and their potential consequences.

- **Experimentation and Opinions:** This involves conducting various experiments on a specific issue to reach an appropriate solution, supported by brainstorming previous experiment results, where generative AI can play a key role in analysis and insight generation.

B. Quantitative Methods: The key methods include [25]:

- **Operations Research:** This method uses a scientific approach to choose alternatives based on mathematical and logical criteria, ensuring sound economic decisions in line with priorities and variables.

- **Probability:** This involves measuring the likelihood of an event occurring and assessing its complexity.

- **Linear Programming:** A method used to determine the optimal utilization of available resources and capabilities.

- **Simulation:** The use of modern technology and computers to evaluate proposed alternatives and select the best one. Here, AI plays a vital role through its various applications.

12. SWOT Analysis as a Key Tool for Drawing Conclusions in Economic Decision-Making

SWOT analysis, developed at the Stafford Institute by Albert Humphrey and colleagues in the 1970s, consists of four essential categories (26):

A. **Strengths:** These describe what the organization or country excels at, highlighting its competitive advantages.

B. Weaknesses: These are factors that hinder the organization or country from performing at its best, requiring improvements to remain competitive.

C. Opportunities: These include favorable external factors that can provide the organization or country with a competitive edge.

D. Threats: These are factors that could potentially harm the organization or country. External threats, such as pandemics and severe climate changes, are unpredictable and difficult to quantify. Notably, some references have replaced the term "Threats" with "Challenges" to emphasize a proactive approach.

To enhance economic decision-making, it is crucial to draw actionable conclusions from each SWOT category rather than merely listing points. This approach ensures that AI algorithms can build decisions on well-defined foundations, facilitating the development of appropriate strategies.

13. PESTEL Analysis as a Tool for Drawing Conclusions in Economic Decision-Making

A. It was first developed in 1964 by Francis Aguilar. (PESTEL) stands for the six key factors that can influence a business: Political, Economic, Social, Technological, Environmental, and Legal. Each of these concepts represents an external factor that can pose opportunities and threats to an organization or a country (27).

B. PESTEL analyses help organizations identify, evaluate, organize, and track the underlying factors influencing business outcomes. They provide valuable insights for strategic planning and selecting alternatives to support economic decision-making. This process is illustrated by a model showing the impact of various sub-factors on each main area, highlighting the need for AI assistance in monitoring and analysis.

«A table showing the PESTEL analysis and the most prominent factors affecting each area as one of the tools for economic decision-making (Researcher's design).»

Abbreviation	P	E	S	T	E	L	M	S
Full word	**POLITICAL**	**ECONOMIC**	**SOCIAL**	**TECHNOLOGY**	**ENVIROMENT**	**LEGAL**	**MILITARY** (Added)	**SECURITY** (Added)
Key considerations	- Government Policy - Political Instability - Corruption - Tax Policy - Labor Law - Trade Restrictions - Financing Grants	- Economic Growth - Exchange Rate - Interest Rate - Inflation Rate - Unemployment Rate	- Population growth rate - Urban distribution - Professional attitudes - Safety focus - Health awareness - Lifestyle attitude - Cultural barriers	- Technology Incentives - Innovation Level - Automation, Digital Transformation, Artificial Intelligence - Research and Development - Technological Change - Technological Awareness	- Weather - Climate - Environmental Policy - Climate Change - NGO Pressure	- Discrimination Laws - Antitrust Laws - Labor Laws - Consumer Protection Laws - Copyright and Patent Laws - Health and Safety Laws	- The ease of obtaining licenses and permits for areas surrounded by camps. - The frequency and reasons for movement restrictions. - Potential external threats. - Handling sensitive data. - Tribal presence in border areas.	- Licenses and permits for areas surrounding security checkpoints - Potential internal threats - Prioritizing security measures - Handling sensitive data - Following security protocols - Cooperation and exchange of security information - Methods used for early detection of vulnerabilities and security gaps - Internal stability - Behavioural impact of the most volatile areas - Crime rate in designated investment areas

Second: The Impact of Artificial Intelligence (AI) on Economic Decision-Making

1. The Relationship Between AI and Economic Decision-Making

AI aims to model human expertise in specific domains, offering automated solutions to support economic decision-making as follows:

A. AI Mechanisms Supporting Economic Decision-Making [28]:

- AI stores, analyzes, and processes systematic rules to uncover facts that inform economic decisions.
- AI enables machines to become more knowledgeable through expert systems.
- AI analyzes citizen behavior and competitors' strategies using generative models to improve service pricing.
- AI accumulates, updates, and preserves human expertise to address recurring market and economic challenges.
- AI leverages scientific and practical knowledge while mitigating human errors like memory loss or knowledge gaps.
- AI generates new insights and expertise for more effective economic decisions.

B. Key AI Research and Development Areas for Economic Decision-Making [29]:

- Robotics: Robots perform tasks by simulating human thinking. Advanced AI research aims to improve production quality and speed, supporting economic decision-making.
- Computer Vision: AI-powered computer vision systems analyze complex data from internal and external environments, enhancing decision-making accuracy.
- Speech Recognition: AI systems interact with users through natural language processing, facilitating brainstorming and priority setting in economic decisions.

2. Factors Influencing Economic Decision-Making Through AI

Key influencing factors include [30]:

A. Social and Psychological Environment in which decisions are made affects outcomes.

B. Individual traits and hesitation in selecting optimal alternatives remain challenges for current AI capabilities.

C. Emergence of new alternatives and unforeseen opportunities may arise during decision-making.

D. Cultural norms and societal customs influence individual and group behavior.

E. Ambiguous goals objectives can hinder decision-making clarity.

3. Drivers of AI Adoption in Economic Decision-Making in Egypt

The most prominent factors can be explained as follows [31]:

A. Affordable high-performance computing benefits from readily available and cost-effective computing resources.

B. The abundance of data availability for learning enables accurate predictions, facilitating data storage, processing, and machine learning. This helps evaluate global and regional economic changes and provides neutral alternatives for decision-makers.

C. Providing a competitive advantage due to the widespread use of AI applications, ease of use, and the expansion of fintech companies through the integration of various technologies with AI, making them faster, safer, and more efficient [32].

4. Fintech companies in Egypt contribute to the development of all economic sectors and enhance the investment climate by offering several advantages, including:

A. Facilitating access to critical information for investment decisions.

B. Providing low-cost financing options, enabling entrepreneurs and businesses to launch new projects through government institutions like the Investment Authority and the Ministry of Trade and Industry.

C. Promoting financial inclusion for small, medium, and micro enterprises by overcoming traditional payment and collection barriers [33].

D. Developing regulatory technologies that enhance market monitoring, balance fintech

promotion, ensure financial stability, and safeguard consumer rights.

5. Positives and Negatives of Using Artificial Intelligence in Economic Decision-Making[34]

A. Key Advantages:

- **Continuous Operation:** Machines work tirelessly, unaffected by time or environmental conditions, facilitating production management and accurate future forecasting[35].

- **Daily Applications:** AI supports everyday tasks, enhancing digital economy growth and financial inclusion. Smartphones with AI-powered systems exemplify this.

- **Digital Assistants:** Many large organizations use AI-based systems to provide customer services, replacing traditional employees.

- **Automation of Repetitive Tasks:** AI efficiently handles repetitive tasks requiring consistent processes, reducing human workload.

- **Data Processing at Scale:** AI processes vast amounts of data quickly, enabling faster economic decision-making.

- **Reduced Error Rates:** AI minimizes calculation and statistical errors, ensuring more accurate decisions [36].

- **Handling Complex Tasks:** AI undertakes challenging tasks like mining, underwater exploration, and volcanic drilling, collecting precise data for economic analysis.

B. Major Disadvantages:

- AI system implementation, updates, and maintenance are costly, limiting adoption for businesses and governments reliant on traditional methods.

- The lack of awareness of artificial intelligence systems about ethics and human values, as they focus only on executing what they were designed for, without considering what is right or wrong in performing tasks.

- The inability of artificial intelligence systems to change or develop their working methods when receiving the same data repeatedly. This limitation may render them useless at a certain stage, particularly when dealing

with political and security issues affecting the economic situation. Such issues require complex and interconnected expertise, data, and conclusions that rely on multiple factors for analysis.

- The lack of artificial intelligence systems' ability to respond to changes and shifts that may occur in the work environment, as well as their inability to innovate and be creative in the way humans can.

- The replacement of many workers and employees due to the use and reliance on AI systems, leading to the loss of expertise. Many economic experts believe that an organization or country may have to rehire these workers in different circumstances where computers or AI applications cannot be used, due to cyberattacks, power shortages, or other reasons [37].

- It is worth noting that one of the recently discussed risks of artificial intelligence is the spread of incorrect and misleading information, bias, and discrimination by program designers, in addition to concerns about the quality and reliability of the data[38].

6. AI Tools and Platforms for Economic Decision-Making:

A. **Data.Ai:** A U.S.-based platform providing unified consumer data and market insights for brands, publishers, and investors [39].

B. **DataRobot:** An AI-driven platform supporting data analysis, business insights, and innovation adaptability [40].

C. **H2O.ai:** A Canadian platform specializing in data access, storage, and retrieval powered by AI [41].

D. **SAS.com:** A British platform using AI for large-scale data management, fostering data transparency and trust [42].

E. **Rationale.Jina.ai:** An Australian-American platform offering AI-powered data analysis tools like SWOT, Pros & Cons, and Multi-Option Analysis [43].

F. **ChatGPT:** An AI language model developed by OpenAI, providing human-like responses for enhanced decision-making [44].

7. Global Examples of AI-Driven Economic Development:

Many countries successfully use artificial intelligence to boost economic development, including the following examples [45]:

A. United States: AI is used in high-tech industries and healthcare for precision surgeries, product development, and data-driven innovations.

B. China: AI supports manufacturing, retail, and consumer experience enhancements through opinion polls and customer analytics.

C. Singapore: AI optimizes logistics, inventory management, and shipping operations in the transport sector.

D. Germany: AI enhances car production and heavy industries by analyzing market needs and competitors' strengths and weaknesses.

E. Japan & South Korea: AI-driven robotics and smart electronics improve consumer welfare, energy management, and technological advancements.

8. AI as a Growth Driver for Businesses:

A. According to the Stanford University report (The AI Index Report 2023), companies in the United States led the world in total private investment in artificial intelligence. In 2022, the investment reached $47.4 billion, which is 3.5 times the amount invested in companies in the second-highest country, China, with $13.4 billion [46].

B. In 2022, the areas of focus in artificial intelligence that received the largest investments were healthcare and medical fields, with $6.1 billion, followed by data management and processing and cloud systems, with $5.9 billion, and financial technology, which received $5.5 billion.

Third: Study Findings and Recommendations for Utilizing Artificial Intelligence in Economic Decision-Making

1. Key Contributions of Artificial Intelligence in Supporting Economic Decision-Making:

   A. AI systems can inventory, regulate, and classify available material and human resources, organize their usage, and create databases for economic analysis, identifying alternatives, strengths, and weaknesses to support rational economic decisions.

   B. AI can track macro and micro environmental variables, their sources, and trends, assigning weights to these factors for economic planning. However, measuring decision-makers' intentions and competitors' responses is challenging, especially when economic decisions turn political. Future advancements might include assessing psychological pressures and responses.

   C. AI can monitor human behavior and gauge public opinion, aiding in deciding whether to proceed with or reconsider a decision based on digital analytics.

2. AI applications analyze problems, generate solutions as scenarios, select the optimal alternative, and store relevant data for future reference in similar situations.

3. Correct decision-making can be difficult due to unpredictable external factors like natural disasters and pandemics. Decision-makers may need to rely on personal judgment and expert consultation, highlighting the continued importance of human expertise.

4. Machine learning integrates external and internal factors, benefiting economic decision-making while considering political, security, social, and environmental impacts.

5. Data mining and organization are foundational for economic decisions. AI technologies, especially generative AI, enhance trust in decision-making through increasingly accurate analyses.

6. The study revealed that smart applications are characterized by accuracy and objectivity, making their decisions less prone to errors and bias. However, it is essential to simultaneously preserve human expertise and transfer it to smart machines so that it can be utilized as much as possible and referred to in case of deviations in performance and outcomes.

7. The elements and components of artificial intelligence assist in making economic decisions quickly and in a short amount of time,

which helps reduce the likelihood of missed opportunities due to slow decision-making or weak coordination between institutions. AI can also calculate probabilities, contributing to saving effort and time, leading to seizing more and faster opportunities.

8. It is worth noting that economic decision-makers may sometimes fail to inform the decision-makers and their assistants of the information they have, which can lead them to build incorrect and misleading algorithms, ultimately resulting in a wrong economic decision in the future. Decision-making is a sequential process, as it is integrated into all management functions. At each management level, decisions are made for subordinates according to their job responsibilities, and they also participate in decision-making for their superiors and the higher levels based on their expertise.

9. From the experiences of smart applications, it has been observed that they sometimes lack human understanding and context. AI applies complex algorithms to inputs and data to produce outputs predicted by its training data, but it lacks the nuances of human understanding. This means that a certain level of human intervention is always necessary.

10. Currently, there is a global spread of smart applications that assist in economic decision-making across several sectors, which must be followed up and developed by the state's tools and means for their growth, as follows:

A. Marketing Decisions:

AI supports marketing decisions by predicting consumer behavior through real-time data collection and trend analysis.

B. Organizations can determine the lifetime value of a customer with the help of the Customer Relationship Management (CRM) model, which assists in managing multiple inputs during the process of making complex decisions. Additionally, artificial intelligence technologies enable the collection and processing of large amounts of data in the shortest possible time.

C. Recommendation Systems:

This technology recommends other products, items, or services to users and has been applied across various industries. In this system, the artificial intelligence model learns the preferences of the consumer (both domestic and international). This information can help the organization reduce the churn rate[47]. The models used can be adapted and developed to find alternatives by classifying the strengths and weaknesses of each option, making it easier to make a decision based on a recommendation in the S.M.A.R.T format:

Specific - Measurable - Achievable - Relevant - Time-Based.

D. Public Opinion Analysis:

Artificial intelligence is capable of providing reliable insights to decision-makers by helping organizations and countries understand human sentiments and their underlying causes. When sufficient opinions are collected and properly analyzed, the gathered information will assist economic decision-makers in measuring and predicting the concerns of the majority and public opinion, while setting priorities without bias. This type of application is crucial for measuring public satisfaction with decisions made, thus contributing to correcting any wrong decisions.

E. Predictive Analytics:

Artificial intelligence uses predictive analytics to analyze historical data, identify patterns, and make accurate predictions. This enables economic decision-makers to anticipate future outcomes and make proactive decisions in various fields.

F. Risk Assessment and Mitigation:

AI supports risk evaluation and reduction through predictive modeling and scenario analysis.

11. Based on the analysis of previous results, the following suggestions can be made:

A. The importance of combining multiple analyses, such as (SWOT) and (PESTEL), into a single table to develop algorithms aimed at creating an application that assists in the information analysis process. This would lead to conclusions that contribute to future forecasting, strategy development, and generating alternatives, especially in strategic decisions at the national level. It has been observed that there is a positive correlation between the use of artificial intelligence and the speed of decision-making. Additionally, there is a reciprocal effect between the use of AI and the speed of response to changes in the macro-environment that impact the decision. Therefore, each factor in the proposed table should be assigned a score based on relative weights (where the relative weight represents the extent of the factor's impact on the total impact of all factors, with the sum of the weights equaling 100%).

In this context, we propose adding two items to the (PESTEL) analysis due to their growing importance in the current and future period: (Military Status) and (Security Status). Thus, we suggest adding the first letters of these variables to create the analysis (PESTELMS), and the design of the algorithm feed table would be as follows:

The proposed table for analyzing the information required for AI algorithms supporting the decision-making process

Factors / Elements of analysis	Strengths S	Weaknesses W	Opportunities O	Threats T	Total Degrees for each element	Parties and Stakeholders	Recommendations in S.M.A.R.T form
Political P	The score after taking into account the relative weight of each factor	The score after taking into account the relative weight of each factor	The score after taking into account the relative weight of each factor	The score after taking into account the relative weight of each factor			
Economic E							
Social S							
Technological T							
Environmental E							
Legal L							
Military and Security M . S							
Total degrees of each factor							
General Analysis							**Preferably, as much as possible:**
Recommendations for Guidance							Who – When – Where – How – Why - How much- The available actual resources, both material and human..

Some considerations that should be taken into account when preparing the table (Subject name - the date - the historical overview of the subject - the current status - a sketch or map if necessary).

Artificial intelligence algorithms can evaluate and analyze complex factors, such as credit scores or cybersecurity threats in financial institutions

B. Organizing Regular Training Sessions on Artificial Intelligence for government employees, university students, and school students, while raising awareness about its advantages and disadvantages in determining policies and decision-making implementation mechanisms.

C. Integrating AI Programs into All Economic Decision-Making Mechanisms in the country, continuously updating them according to information security and cybersecurity rules. This will enable government bodies to make suitable, secure, targeted, and timely decisions, as well as support and monitor them.

D. Encouraging Scientific Research by Establishing New Centers based on available resources or by Reengineering the Current Organizational Structure of the Academy of Scientific Research to be equipped for research on developing local competencies and utilizing them, even if these talents specialize in writing AI codes and models, which may be outside their original academic field of expertise.

E. Developing Software Encryption Tools and Focusing on Information Privacy for Economic Institutions: This requires the involvement of experts and specialists, including legal professionals and engineers in the electronic field, to address potential security breaches and provide solutions.

F. Studying the Creation of a New Specialization in Engineering and Law Faculties: "Legal Engineer": This specialization will become increasingly important in the future, facilitating the creation of legislative frameworks for dealing with artificial intelligence.

G. Building Trust in Decision-Makers When Using AI Technology: This can be achieved through testing and integrating expert opinions with AI decision-making in the early stages of trials.

H. Enhancing the Focus on Time Factors and Reducing Stages and Timelines for Completing Tasks and Cross-Collaborations: This can be done by relying on AI technology in the administrative system of the state, particularly in service sectors such as healthcare, education, justice, and local development as an initial phase, and in other sectors that attract investments.

I. Creating Clear Institutional Frameworks and Partnerships between the public and private sectors both domestically and internationally, along with implementing multiple controls to assist efforts in integrating AI applications into the economic decision-making process, in accordance with the laws and regulations of the institution/country.

J. Updating Existing Laws and Regulations to refine the role of AI applications in economic decision-making, in order to keep up with rapid advancements in this field.

K. Enacting Necessary Legislation to regulate electronic administrative work, as well as laws related to the criminal classification of potential cybercrimes resulting from the use of artificial intelligence.

L. Allocating Financial Resources from the National Budget to each relevant ministry involved in economic decisions, allowing them to purchase AI applications that support the economic decision-making process, given their positive returns, while considering the security rules and precautions set by the concerned security agencies.

M. Engaging in Regional and International AI Alliances focused on providing a more equitable and responsible global ecosystem, especially in light of the emerging future issue of e-waste recycling and its economic impact.

N. It is essential for institutions and the state to focus on the concept of artificial intelligence, as well as user behavior, training, and development processes. Additionally, efforts should be made to ensure governance and caution regarding the spread of misleading information that

AI could help generate, as this can affect the accuracy and health of decision-making and public opinion.

O. In light of the Egyptian state's decision-making process through the "economic group," it is proposed to integrate AI programs into the process from the stage of problem identification and planning, through all stages of decision-making.

P. Expanding the use of AI in circular economy steps, such as reducing waste and maximizing resource use through the reuse and recycling of products and materials, following three steps: reduction, reuse, and recycling.

Q. Enhancing the role of AI and cybersecurity in investing in smart energy networks, which are the future of renewable energy. This would aim to reduce the high costs of implementation, create a conducive environment for the spread of digital technology, rely on renewable energy sources, and achieve net-zero emissions.

Conclusion:

AI systems and big data play a crucial role in enhancing the rationality of administrative and economic decisions through their various advantages, which bring speed and accuracy to decision-making while minimizing errors. This results in increased chances of success in solving problems at the right time and avoiding negative consequences from delays or poor decisions. With the vast digital data available today, every transaction, user reaction, and economic indicator along with images and videos serve as valuable information that leads to better economic decisions and responses to this new, data-rich environment.

In the near future, decision-making using AI will grow rapidly. Consequently, all countries, international institutions, and non-state actors will strive to utilize AI, particularly in areas such as virtual assistants, augmented and virtual reality, process discovery, task extraction, data analytics, and business intelligence platforms.

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The Importance of Artificial Intelligence in Economic Decision-Making in Egypt

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Abstract:

The importance of artificial intelligence is that it can simulate human behavior in thinking to solve problems and the ability to store data and results for use in the future through various methods that are not affected by danger, exhaustion, or psychological pressure and make the person focus on more important things in the decision-making process. New generation models of artificial intelligence based on generative artificial intelligence have recently emerged through their ability to deconstruct problems and analyze them to find solutions based on form scenarios from which the optimal alternative is chosen after weighing the pros and cons of each alternative impartially and storing various data related to this process to exploit it when facing a specific problem. It has proven its efficiency in multiple industrial, economic, and service fields. It is a technology that works to raise the efficiency and effectiveness of workers and achieve There are several advantages to the decision-making process, especially the economic one, due to the multiple factors affecting it. The external macroenvironment and the internal environment may affect the quality and rationality of the decision according to profit and loss calculations and the jurisprudence of priorities.

Keywords: Artificial Intelligence, Economic Decision Making, Data Analysis.

أهمية الذكاء الاصطناعى فى اتخاذ القرار الاقتصادى فى مصر

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المستخلص :

تأتى أهمية الذكاء الاصطناعى القادر على محاكاة السلوك البشرى فى طريقة التفكير لحل المشكلات والقدرة على تخزين البيانات والنتائج لاستخدامها فى المستقبل من خلال مختلف الطرق التى لا تتأثر بالخطر والإنهاك والضغوط النفسية، وتجعل الإنسان يركز على أشياء أكثر أهمية فى عملية اتخاذ القرار بفضل النتائج الدقيقة المقدمة، برزت حديثًا نماذج الجيل الجديد من الذكاء الاصطناعى القائمة على (الذكاء الاصطناعى التوليدى) من خلال قدرتها على تفكيك المشكلات وتحليلها فى سبيل إيجاد حلول على شكل سيناريوهات يتم اختيار البديل الأمثل منها بعد المفاضلة بين إيجابيات وسلبيات كل بديل بشكل حيادى، وتخزين مختلف البيانات المتعلقة بهذه العملية فى سبيل استغلالها عند مواجهة مشكلة معينة، وقد أثبت كفاءته فى مجالات متعددة صناعية واقتصادية وخدمية، فهو تقنية تعمل على رفع كفاءة وفاعلية العاملين وتحقيق عدة مزايا فى عملية اتخاذ القرار، لاسيما الاقتصادى نظرًا لتعدد العوامل المؤثرة عليه من البيئة الكلية الخارجية والبيئة الداخلية، وهو الأمر الذى قد يؤثر على جودة ورشادة القرار وفقًا لحسابات الربح والخسارة وفقه الأولويات .

الكلمات المفتاحية : الذكاء الاصطناعى، اتخاذ القرار، صنع القرار، تحليل البيانات.