

The reality of using artificial intelligence applications as a proactive tool for crisis management: Saudi Arabia as an example

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Abstract:

This study aims to highlight the contribution of artificial intelligence applications as a proactive tool in crisis management, using a descriptive analytical approach and case study methodology, by providing a conceptual presentation of both artificial intelligence and crisis management, and analyzing the nature of the relationship between them.

The study concluded that the deployment of artificial intelligence technologies contributed significantly to enhancing proactive capabilities for crisis prediction and management in the Saudi Arabia during the COVID-19 pandemic. The findings further demonstrated the effectiveness of government digital applications—particularly the Tawakkalna application—in supporting monitoring, follow-up, and decision-making processes, alongside the institutional role played by the Saudi Data and Artificial Intelligence Authority (SDAIA) and King Abdulaziz City for Science and Technology (KACST), reflecting the integration of national efforts in leveraging artificial intelligence for crisis management.

The study recommended the need to unify and integrate efforts between SDAIA as a digital executive institution, and KACST as a national research institution, enabling the Kingdom to build an integrated and effective proactive crisis management system.

Keywords: Artificial intelligence, crises, crisis management, prediction, proactive ability.

Jel Classification Codes: C55, H12, C53.

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1. INTRODUCTION

Over the past decades, the world has witnessed tremendous developments in the field of artificial intelligence, making it one of the most prominent domains that have transformed the world. Amid the Fourth Industrial Revolution's shift towards digital transformation and the reliance on artificial intelligence technologies, the promotion of innovation across various fields, future strategies of several Arab countries have focused on leveraging its applications. and the reliance on artificial intelligence technologies.

Given the challenges that institutions face today, crisis management has become an imperative necessity to ensure continuity and minimize losses. Dealing with crises after they occur is no longer an acceptable option, the ability to anticipate and proactively address risks now represents the key difference between institutions capable of resilience and those trapped in a cycle of reactive responses. Here the importance of applying modern and effective approaches, to proactive crisis management that rely on technology has emerged, as artificial intelligence contributes to accelerating decision-making processes and providing accurate information in a timely manner, thereby helping to reduce the impact of crises and control them efficiently.

The COVID-19 pandemic has served as a global test of countries readiness on both health and technological levels, highlighting the urgent need for digital tools capable of prediction, analysis and rapid response to health-related changes. In this context, the Kingdom of Saudi Arabia stands out as one of the countries that effectively employed artificial intelligence within its plans to confront the pandemic, through smart applications for data analysis as well as predictive models.

From this perspective, this study aims to address the following research question:

How were artificial intelligence applications utilized in the Saudi experience during the COVID-19 pandemic as a proactive tool for crisis management?

1.1 Research Hypotheses:

The effective utilization of artificial intelligence contributes to enhancing proactive capabilities in predicting and managing crises in the Kingdom of Saudi Arabia.

!Research Objectives:

- ✓ To identify the theoretical framework of both artificial intelligence and crisis management, as well as the relationship between them.
- ✓ To analyze the role of artificial intelligence in predicting and managing crises, through the study of practical applications during the COVID-19 crisis in the Kingdom of Saudi Arabia.
- ✓ To highlight the efforts of national institutions such as the Saudi Data and Artificial Intelligence Authority (SDAIA) and King Abdulaziz City for Science and Technology (KACST) in crisis prediction.
- ✓ To propose practical recommendations to enhance the use of artificial intelligence as an effective proactive tool in managing future crises in the Kingdom.

Research Methodology:

To achieve the objectives of the study and address the proposed research problem, as well as to gain a comprehensive understanding of all aspects related to the topic, the study adopts a descriptive-analytical approach. This involves describing the current state of artificial intelligence and crisis management, by highlighting their theoretical dimensions through the collection and analysis of information and data from relevant studies and academic articles. In addition, a case study approach is employed, focusing on the experience of the Kingdom of Saudi Arabia during the COVID-19 pandemic.

2. The conceptual framework of artificial intelligence:

Since the first emergence of the Industrial Revolution in England in the 18th century, the world has begun to move toward the age of technology, clearly reflecting the development of human life and well-

being. Today, however the world is witnessing a Fourth Industrial Revolution that focuses on integrating physical, digital, and biological technologies with artificial intelligence. This revolution has created numerous unique growth opportunities for various global economies, in contrast to previous industrial revolutions, which focused on steam power, electricity, and computing.

Within the context of this modern revolution, the integration of artificial intelligence and robotics into everyday life has been accelerating at an increasing pace. Researchers and developers believe that artificial intelligence may become so powerful that it could be difficult for humans to fully control it.

2.1 The Concept and Importance of Artificial Intelligence:

Artificial intelligence consists of two words: the first is **artificial**, which refers to something that is man-made, and the second is **intelligence**, which means the ability to understand and think, Defining intelligence is often more difficult than defining what is artificial, as intelligence refers to an “individual’s cognitive abilities that enable them to deal with daily life situation” **(Moussa & bilal , 2019, p. 18).**

Artificial intelligence is: "the process of developing computer systems, so that they are able to perform human tasks, such as speech recognition, decision-making, and translation "**(boubaha , 2022, p. 93).**

Artificial intelligence can be defined as a branch of computer science, that focuses on developing systems, equipment, and software that simulate human mental abilities and multiple characteristics: learning, reasoning, thinking, reacting, making decisions, and perceiving even in situations for which they have not been programmed or trained.

Artificial intelligence has also been defined as “the behavior and specific characteristics exhibited by computer programs that enable them to simulate human cognitive abilities, and patterns of operation. Among the most important of these characteristics are the ability to learn, infer and respond to situations for which the machine has not been explicitly programmed” **(boubaha , 2022, p. 93).**

And It is “a science concerned with the design and development of machines, that perform actions regarded by humans as intelligent behavior,

with the primary goal of enabling computers and other machines to acquire intelligence.” (abd elnour, 2005, p. 7).

From the previous definitions, it can be concluded that artificial intelligence (AI) is a multidisciplinary field that combines computer science, mathematics, and data science. It aims to design and develop intelligent systems capable of simulating human cognitive processes, such as perception, learning, reasoning, and decision-making, by relying on the analysis of large amounts of data and advanced algorithms. This enables the enhancement of human performance and supports strategic decision-making, particularly in complex environments and crisis situations.

Accordingly, four types of intelligent systems can be identified, as illustrated in the following figure:

figure 1: Illustration of the Types of Intelligent Systems



Source :(boubaha , 2022, p. 94).

The importance of artificial intelligence lies in enabling organizations to transition from traditional methods to smart and proactive approaches, especially when facing challenges and crises, making it a key strategic tool in the digital era. Some of its main aspects can be highlighted in the following points: (abd elnour, 2005, p. 9).

- ✓ Contributing to the preservation of accumulated human expertise by transferring it to intelligent machines.
- ✓ The ability to use human language to interact with machines instead of computer programming languages.
- ✓ Assisting in diagnosing diseases, prescribing medications, providing legal and professional consultations, interactive education, and security-related fields.
- ✓ Supporting decision-making processes Intelligent systems operate with autonomy, accuracy, and objectivity, producing decisions that

are free from errors, biases, racism, preconceptions, or external and personal interventions.

- ✓ Reducing risks and psychological pressures, allowing humans to focus on more important tasks. This is achieved by deploying machines to perform arduous and dangerous tasks, explore unknown areas, and participate in rescue operations during natural disasters.

The importance of artificial intelligence encompasses many aspects, and indeed, it is not easy to fully enumerate them, It must be acknowledged, that AI may even surpass humans in scientific research, making it a significant factor in accelerating growth and development across all scientific fields.

2.2 Classifications of Artificial Intelligence

Artificial intelligence (AI) is considered one of the most influential technologies of the twenty-first century, as it has led to numerous achievements that were once mere dreams. Its use has expanded across various sectors such as healthcare, finance, banking, and more, making it an integral part of our daily lives, AI is derived from several fields and is applied in many areas of life.

There are three levels of artificial intelligence capabilities, namely: (boubaha , 2022, p. 95)

- ✓ **Super Artificial Intelligence (Super AI):**

is used to describe the process of developing artificial intelligence to a level at which the machine's cognitive abilities surpass human capabilities in performing certain tasks.

- ✓ **Strong Artificial Intelligence:**

Strong artificial intelligence asserts that a computer can be programmed to function as a human mind, and be intelligent in the full sense of the word. It would possess awareness, beliefs, and other cognitive states that are typically attributed only to humans. Its main characteristics include the ability to think and interact intelligently, solve puzzles, make judgments, plan and learn, and communicate effectively. It should also have consciousness, subjective thoughts, and emotions.

- ✓ **Weak Artificial Intelligence:**

weak AI systems possess limited intelligence that simulates intelligent

behavior within a specific domain. Examples include Apple's intelligent personal assistant application, which uses the internet as a powerful database to answer users' spoken questions and engage in conversations with real individuals. However, it operates in a very limited and predefined manner. This can be demonstrated by the inaccurate results it produces when handling conversations for which it has not been programmed to respond.

Based on the above, artificial intelligence is considered the most widespread level at present, as it is limited to performing specific tasks with high efficiency, such as data analysis, risk prediction, and decision support within organizations. This level is characterized by its practical applicability in fields, such as strategic planning and crisis management, due to the speed of processing and accuracy of prediction it provides. In contrast, general artificial intelligence represents a future stage aimed at simulating human cognitive abilities in learning and understanding across multiple domains. However, it remains under research and has not yet reached the stage of organizational application. As for super artificial intelligence, it is regarded as a theoretical concept that exceeds human intelligence in various functions, and raises significant ethical and security challenges, which is why current efforts focus on developing and investing in levels of artificial intelligence that are practically applicable within organizations.

2.3 Artificial Intelligence Services

In recent years, organizations have witnessed a remarkable expansion in the adoption of artificial intelligence services, as they have become one of the fundamental pillars of digital transformation and institutional performance improvement. These services consist of a set of intelligent applications and systems capable of analyzing big data, automating processes, supporting decision-making, and predicting risks, relying on advanced technologies such as machine learning, natural language processing, and computer vision. Artificial intelligence services have contributed to increasing operational efficiency, reducing costs, and enhancing the competitive advantage of organizations, particularly in complex and unstable environments. Accordingly, the deployment of these services has become a strategic necessity, especially in the fields of strategic planning and crisis management, due to the speed of response and

accuracy of prediction they provide in addressing various challenges. These services can be summarized as follows: (htt12)

✓ **Natural Language Processing (NLP)**

Helps improve human-machine interaction by understanding human language, such as text analysis and machine translation. This technology is used in developing systems like Google Translate, which enables people to communicate across different languages.

✓ **Machine Learning**

Used to build models capable of learning from data and improving their performance over time. It is applied in a variety of applications such as prediction and analysis, Many commercial applications today rely on machine learning algorithms to provide accurate recommendations to users.

✓ **Computer Vision**

Enables machines to recognize images and videos, which helps in applications like facial recognition, classification, and autonomous driving. This technology is used in security and surveillance, where facial recognition systems can analyze faces in real time.

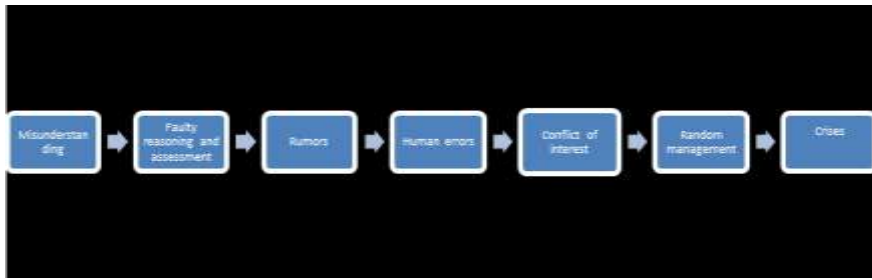
✓ **Intelligent Robotics**

Used in automation and interaction with the environment, They can be applied in various fields, from manufacturing to healthcare.

3. Cognitive Perspective of Crisis Management

Organizations face multiple crises during their course of operation, Since a crisis can cause significant strain on an organization, affecting both material and human resources, it has become necessary to address such crises. Every crisis has precursors that indicate its onset, evidence pointing to its occurrence, and a conclusion that reinforces it. The causes of crises can be summarized as shown in the following figure:

Figure 2: An Illustrative Diagram of the Causes of Crises



Source: (Alyassiri nidaa, 2014, p. 66)

This is where the role of crisis management comes into play, as it has become the most suitable and effective means to find appropriate solutions and to monitor the developments and progress of a crisis, The success of crisis management is also linked to its ability to efficiently utilize available resources, capabilities, and technology in order to confront the crisis or mitigate its negative effects.

3.1 The Concept of Crisis Management and Its Phases:

The concepts of crisis management have varied according to different perspectives, as definitions differ due to the diversity of disciplines and the range of ideas and opinions. In this context, crisis management “aims to achieve a rapid, high, and effective response to the changing conditions of a crisis, to prevent errors before they occur, and to exercise control and make decisions.” **(baker , 2011)**

Crisis management can also be defined as a “process aimed at anticipating crises before they occur, It also involves addressing both their negative and positive components, Like any administrative process, it encompasses three fundamental stages: planning, control, and evaluation ”. **(djelda, 2011, p. 19)**

It can also be defined as “the art of handling crises in light of available resources and prevailing management styles, or as the application of administrative functions while investigating the causes of a crisis to identify these causes and their dimensions, pending the development of appropriate solutions”. **(ADOUI, 2007, p. 21)**

From the previous definitions, it can be concluded that crisis management is a comprehensive process aimed at planning and preparing to confront unexpected and sudden events, that may negatively affect an organization or a community.

Crisis management also goes through several stages, some of which involve procedures carried out before the crisis occurs, others during the crisis, and some after the crisis, as follows:

(Khamra & Bahaz, 2021, pp. 202,203)

- ✓ **Early Warning Signal Detection (Pre-Crisis):** This refers to the stage before the crisis begins, It involves the organization's ability to respond to any indicators, by monitoring and identifying signs or symptoms that suggest the potential occurrence of a crisis, The first step includes establishing a team responsible for careful future-oriented planning, using tools such as scenarios, simulations, and others.
- ✓ **Preparedness and Prevention (Pre-Crisis):** This stage represents the organization's efforts to prepare and get ready to face the crisis, after confirming that it cannot be avoided, with the aim of minimizing its potential damages, while continuing measures to prevent its occurrence.
- ✓ **Damage Containment or Mitigation (During the Crisis):** This stage represents the peak of the crisis, Management must implement the plans that were prepared, begin utilizing all available tools and methods, and optimally employ resources to reduce the damages caused by the crisis.
- ✓ **Activity Recovery (During the Crisis):** This phase occurs as the crisis gradually subsides, during which management restores balance and normal operations to their pre-crisis state, At this stage management has identified the causes of the crisis, enabling the adoption of realistic solutions.
- ✓ **Post-Crisis Learning:** This phase begins after the crisis ends, and is characterized by evaluating the plans and methods used to handle it, extracting lessons learned, and gaining practical experience from the encountered crisis. This knowledge allows the organization to prevent the recurrence of the same or similar crises in the future and fosters continuous improvement and development.

3.2 Crisis Management Strategies:

The strategies for dealing with crises can be summarized as follows: **(abid nail , 2020, pp. 135,136)**

✓ **Crisis Suppression Strategy:**

This strategy refers to delaying the emergence of a crisis, It involves a direct approach aimed at eliminating the crisis through the use of strong measures to suppress it, by means of rapid intervention, attempting to halt its events and eliminate its sources.

✓ **Crisis Defusion Strategy:**

This strategy aims to eliminate the crisis gradually by reducing its intensity and impact over time.

✓ **Crisis Denial or Underestimation Strategy:**

This strategy involves denying the existence of the crisis in order to deprive the opposing party of opportunities, as well as protecting individuals from media campaigns by convincing them that no crisis exists or by downplaying its seriousness.

✓ **Crisis Forces Isolation Strategy:**

In this strategy, crisis forces are classified into crisis- creating forces, supporting forces, and forces concerned with the crisis. After classification, the crisis- creating forces are isolated from the course of the crisis and from their supporters through various means.

✓ **Crisis Containment Strategy:**

This strategy focuses on surrounding the crisis, and preventing its spread to other areas or sectors.

✓ **Crisis Escalation Strategy:**

This strategy emphasizes intensifying the crisis and is employed in special cases, to achieve specific objectives.

✓ **Crisis Fragmentation Strategy:**

This strategy is used in major crises and is based on a comprehensive, detailed, and accurate understanding of all forces forming crisis alliances. Through in- depth analysis, conflicting interests and potential benefits acceptable to alliance members are identified, and the unity of these alliances is weakened by creating artificial leaderships for each direction.

3.3 The Administrative Role in Crisis Management and Its Constraints:

Modern management thought has proposed a number of steps that can be

followed when a crisis occurs, as follows: **(Raouabeh & Gassri, p. 337)**

- ✓ Selecting the best qualified personnel to form a crisis management team.
- ✓ Effective time planning during crises.
- ✓ Providing moral motivation during crises.
- ✓ Encouraging creativity and innovation, and stimulating a creative spirit among employees to propose unprecedented solutions and ideas.
- ✓ Accurately defining the problem, analyzing it, and then selecting the most appropriate solution from the available alternatives.
- ✓ Accepting and adapting to change during crises.

Crisis management also faces many difficulties and obstacles that hinder the achievement of its objectives in the desired manner, These obstacles can be classified as follows: **(boutharane & chorfa , 2018, pp. 26,27)**

Human Constraints: These constraints are related to the human nature of individuals, and the prevailing organizational culture within the institution. They include:

- ✓ The lack of belief in the existence of crises and the failure to acknowledge them.
- ✓ Individuals' limited ability to recognize and understand sources of risk.
- ✓ Excessive reliance on group opinion.
- ✓ The belief that crises are of little or no importance.

Organizational Constraints: These constraints are associated with organizational aspects, including:

- ✓ Ambiguity in defining authority and responsibility.
- ✓ Differences in individuals' cultural backgrounds.
- ✓ Limited understanding and awareness among leaders regarding crisis management methods.
- ✓ Lack of qualification and training in the field of crisis management.

Information-Related Constraints: These constraints are linked to the availability and accuracy of information, such as:

- ✓ Difficulty in verifying the accuracy and reliability of information sources, or withholding part of the information required by decision-making centers.

- ✓ Manipulation or distortion in the timing of information delivery, whether delayed or premature.

Communication-Related Constraints: These constraints include:

- ✓ Difficulty in transmitting and exchanging information within and outside the organization.
- ✓ Limited use of modern communication systems in responding to crises.
- ✓ Failure to keep members of the activity recovery team informed about ongoing developments, leading to a loss of control over the crisis.

4. From Prediction to Decision-Making: Artificial Intelligence in the Service of Crisis Management

The term artificial intelligence in crisis management refers to the use of AI technologies to enhance crisis management processes, This includes crisis prediction, improving decision-making, risk assessment, and developing effective response strategies during crises.

4.1 Artificial Intelligence Techniques for Crisis Management:

Artificial intelligence and its ability to address crises depend on the availability of data, The more intelligent systems are supplied with data and information, the greater their capacity to assist humans in dealing with crises. Artificial intelligence is considered a new promise, as it plays important roles before, during and after a crisis. Among the most important information technologies that enhance the ability of artificial intelligence to manage crises are the following: (rachad , 2023, pp. 74,75)

- ✓ **Internet of Things (IoT):** Recently, the Internet of Things has played an increasingly important role, It refers machine-to-machine communications via the internet, significantly enhancing disaster response and recovery efforts, IoT can mitigate disasters through early warning systems, as machines use IoT-based sensors to monitor adverse conditions, trigger automatic alerts, monitor infrastructure, and integrate with devices such as satellites to provide a comprehensive view of the crisis, Some studies describe IoT as an open network of smart objects capable of self-organization and automatic sharing of information, data, and resources, enabling them to interact and act in response to environmental changes and crises.

- ✓ **Edge Computing:** Edge computing plays a critical role during crises, by enabling local data processing in case of network instability, This facilitates decision-making and also supports information sharing among different response teams, coordinating efforts to make informed decisions.
- ✓ **Remote Sensing:** Remote sensing provides timely data during crises, allowing for an accurate assessment of the situation, prioritization of response actions, allocation of resources, and decision-making. It also delivers information on weather conditions and potential hazards for proactive management, and offers insights into damages to infrastructure.
- ✓ **Big Data:** Big data serves multiple important functions, including providing information for decision-making and prioritizing response efforts. It supports the analysis of social media and other data sources, identifies areas needing immediate aid and effective support, analyzes satellite images to provide a complete picture of the crisis or disaster, evaluates historical crisis data, and supports early warning systems. Studies highlight the significant role of big data in crisis prediction.
- ✓ **Cloud Computing:** Cloud computing plays a vital role in storing data applications securely and flexibly after a crisis occurs, It assists in gathering information to set priorities and make decisions, supports real-time scenario modeling, enables accurate decisions based on affected communities, and facilitates collaboration and timely information sharing for coordinated efforts.
- ✓ **Data Quality and Quantity:** Both aspects are crucial in crisis management, Data quality refers to accuracy and completeness, which supports informed decision-making, Data quantity is equally important, providing the volume needed for effective analysis and decisions.

Together, these technologies provide essential inputs to various artificial intelligence systems, supplying the information and data necessary for crisis prediction, management, and response.

4.2 The Role of Artificial Intelligence in Crisis Prediction:

There is no doubt that modern technology has played a prominent role in contributing to crisis resolution, This role is evident in all stages of crisis

management, particularly through crisis prediction, which allows for effective planning, preparedness, and decision support. The role of artificial intelligence in crisis prediction can be summarized as follows: **(amine, no date, pp. 2266,2267)**

- ✓ The role of artificial intelligence in the pre-crisis phase is manifested in crisis prediction through the use of big data models to identify the fundamentals of the crisis, and provide necessary solutions, thereby enabling accurate forecasting.
- ✓ AI also plays a role in the pre-crisis phase by supporting expert interaction, and training of the organization's staff, as scientific research has emphasized the importance of training decision-makers and their teams.

5. Effectiveness of Artificial Intelligence in Forecasting Crises: A Case Study of the Saudi Experience

saudi Arabia has witnessed rapid development in digital transformation, adopting national strategies under the framework of Saudi Vision 2030 aimed at promoting innovation and localizing artificial intelligence (AI) technologies across various sectors. Crisis prediction has emerged as one of the key areas where AI has been effectively utilized, particularly during the COVID-19 pandemic, providing a practical model to test AI's proactive crisis management capabilities. The Kingdom possesses an integrated technological ecosystem, including large-scale databases, advanced data centers, and cloud computing, which facilitated the effective implementation of predictive models.

The authorities relied on collecting and analyzing big data from diverse sources such as hospitals, satellites, sensors, and social media to identify early patterns indicating potential crises. The Saudi Data and AI Authority and the Ministry of Health launched a joint project, SDAIA, to analyze and forecast the spread of COVID-19 across cities, and provinces in the Kingdom. This initiative supported decision-makers in monitoring the pandemic's development, and taking appropriate preventive measures, leveraging AI technologies and advanced statistical analytics. By using machine learning algorithms and predictive models, SDAIA was able to

anticipate multi-sector crises, including health crises, environmental crises such as floods and wildfires, as well as economic and security-related crises. Early prediction enabled government authorities to make rapid and effective decisions to minimize damage and protect human and material resources.

During the early stages of the COVID-19 crisis, SDAIA launched electronic initiatives and services, that contributed to containing the crisis and mitigating its health impacts, Among these was the Saudi COVID-19 Dashboard, a collaborative effort between SDAIA and the Ministry of Health, which aimed to analyze and forecast the spread of the virus, using AI and advanced statistical analysis. This tool helped detect the first COVID-19 case in the Kingdom. SDAIA embraced a proactive management approach, moving beyond mere crisis response and transforming the challenge into a sustainable technological model, which made the Saudi experience unique.

SDAIA did not limit itself to monitoring cases but also developed advanced predictive models through:

- ✓ **Predictive Algorithms:** Using machine learning to analyze infection trajectories before they occurred in specific regions, allowing the government to implement localized precautionary quarantines instead of nationwide lockdowns.
- ✓ **Geospatial Data Analysis:** Linking health data with geographic locations to accurately identify potential outbreak clusters.

SDAIA also implemented a number of initiatives to address the COVID-19 pandemic, support the security and health sectors, and enhance community participation in containing the pandemic through: **(htt13)**

- ✓ **Decision Support:** Through the Operations Center and the Saudi COVID-19.
- ✓ **Crisis Containment:** Utilizing the **Tawakkalna** system, the **Tabaud** application, and the **Absher** platform, the authorities were able to manage and contain the pandemic effectively.
- ✓ **Business Continuity:** Ensured via the **Burooq** platform, the precautionary committee, remote training programs, and the University Graduates Assessment Center.

One notable application is **Tawakkalna**, which is based on artificial intelligence for planning and predicting infection hotspots, thereby supporting decision-makers. **Tawakkalna** evolved from a simple permit issuance tool into a proactive digital life ecosystem by:

- ✓ **Managing Testing and Vaccinations:** Automating appointment bookings and delivering test results instantly, preventing overcrowding at testing centers.
- ✓ **Automated Permissions:** Linking individuals' health status to access rights for public and private facilities, creating a safe technical environment without intensive human intervention.

Researchers at the King Abdulaziz City for Science and Technology (KACST) also developed the KACST model, which relies on AI systems and big data analytics to simulate the movement of individuals within cities. KACST is an independent governmental institution, both scientifically and administratively, established in 1977. It plays a central role in planning scientific and technological policies, supporting research and innovation in the Kingdom, and has made direct contributions to developing AI technologies and their applications in crisis prediction.

Within the framework of Saudi Vision 2030, the Saudi Data and AI Authority (SDAIA) has become the backbone of the digital economy. Its adoption of proactive crisis management, particularly during the COVID-19 pandemic, accelerated the digital transformation of government services, reaching over 90% digitalization, thereby enhancing governmental efficiency and the quality of services provided to citizens.

6. CONCLUSION

Today, artificial intelligence (AI) represents one of the most important strategic tools that enhance a country's ability to predict and manage crises efficiently and effectively. The Saudi experience, particularly during the COVID-19 pandemic, has demonstrated that investment in digital infrastructure and the adoption of AI technologies can make a significant difference in crisis response through early prediction, big data analysis, and more effective resource allocation.

Saudi Arabia has shown advanced capabilities in leveraging AI across

multiple domains, including health, environmental, and economic crises, benefiting from institutions such as the Saudi Data and AI Authority SDAIA and KACST. The predictive models employed have demonstrated a high degree of accuracy, making the SDAIA experience a leading Arab example of how AI can become an effective strategic tool for crisis prediction and management within a well-organized institutional framework.

Results Achieved:

The Kingdom possesses an integrated technological ecosystem, including large-scale databases, advanced data centers, and cloud computing, which have facilitated the effective implementation of predictive models.

✓ During the COVID-19 pandemic, **SDAIA** played a pivotal role in developing artificial intelligence models, to predict the spread of the virus.

✓ Government applications such as **Tawakkalna**, **Tabaud**, and the **Absher** platform were launched, utilizing AI to track and predict infection hotspots.

✓ **KACST** collaborated with government and academic institutions to develop predictive models for virus spread using AI, as well as supporting the establishment of research centers in Saudi universities to advance predictive algorithms.

Based on the analysis of this experience, a set of scientific and practical recommendations was formulated specifically for the key stakeholders, primarily **SDAIA** and **KACST**. By unifying efforts **SDAIA** as an executive digital authority and **KACST** as a national research institution the Kingdom can build a comprehensive proactive crisis management system that combines technology with scientific planning, relying on accurate data, intelligent models, and immediate strategic decision-making.

7. Bibliography List :

1. Books :

1. abd elnour, Adel. (2005). *Introduction to Artificial Intelligence*. Kingdom of Saudi Arabia (KSA): King Abdulaziz City for Science and Technology (KACST).
2. abid nail , Atiya. (2020). The Impact of Leadership Empowerment on Crisis Management at the General Directorate of Civil Defense in the Gaza Strip. *Journal of Economic Sciences, Management Sciences, and Commercial Sciences*, 13(3).
3. ADOUI, Zaid Monir. (2007). *Crisis Management*. AMMAN: Treasures of Knowledge Publishing and Distribution.
4. Amine, Bisma. (no date). "The Role of Artificial Intelligence in Agile Crisis Management: An Applied Study on the Management of the COVID-19 Crisis. *Al-Qanun Journal: A Specialized Journal in Legal Studies and Research*.
5. baker , Dalia. (2011). *Crisis Management Methods and the Feasibility of Their Implementation*.
6. boubaha , Souad. (2022). Artificial Intelligence Applications and Reflections. *Journal of Financial and Business Economics*, 6(4).
7. boutharane , Leila., & chorfa , Ilyes. (2018). Crisis Management: Methods and Obstacles. *Journal History of Sciences*(11).
8. djelda, Botross. (2011). *Modern Strategies for Crisis Management*. Amman: Al-Raya Publishing and Distribution.
9. Khamra , Taher , & Bahaz, Djilali . (2021). The Role of Administrative Leadership in Crisis Management in Organizations. *[Economic Additions]*, 5(2).
10. Moussa , Abdallah, & bilal ,Ahmed. (2019). *Artificial Intelligence: A Technological Revolution of the Modern Era*. Cairo: Arab Group for Training and Publishing.
11. rachad , Zaki (2023). Artificial Intelligence in Addressing Crises and Disasters Opportunities and Challenges. *International Journal of Human Studies*, 11.

12. Raouabeh ,Abd rahman., & Gassri, Mohamed. (s.d.). Crisis Management Strategies in Organizations. *Dafatir Iqtisadiyya Journal*, 12(2).

2. Internet websites:

- ✓ (<https://darbplatform.com>, s.d.),date of visit 22.07.2025, hour 23:29.
- ✓ (<https://sdaia.gov.sa/ar/MediaCenter/Pages/CoronaPandemic.aspx>,date of visit 10.09.2025, hour 23:00.