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ARTIFICIAL INTELLIGENCE AND CRISIS MANAGEMENT

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Abstract

In a world marked by crises such as the recent pandemic and wars, artificial intelligence based tools become an important addition in the decision-making process. Crisis management represents the way in which policymakers have to act in order to solve a sudden state of emergency. Sometimes it occurs that the situation is an unprecedented one as the case of the COVID-19 pandemic in which global-level governance had to take actions either based on the other states' responses or on their own. The large quantities of data that are available at present can no longer be analyzed with the aid of traditional techniques and are currently done by AI tools. As a disruptive technology, artificial intelligence has proven itself to be useful in many domains and has showed an impressive potential in changing all of the societal pillars. Artificial intelligence can be defined as the computers' ability to manifest human-like reasoning and solve situations that would normally imply human intelligence.

Keywords: artificial intelligence, crisis, risk management

JEL Classification: D81, H12, O30

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Introduction

The term "crisis" represents a state of emergency or an imbalance that occurs in the aspects of life. There is a plethora of crisis types from financial to medical to war. Crisis management refers to a situation in which the event that occured is threatening the societal safety and security and has to be approached in order to prevent worsening. It is the process of responding to major situations that have suddenly emerged and containing and recovering from that state (Coombs & Laufer, 2018).

The word crisis stands for a turning point for better or for worse or a crucial time that requires timely actions to be taken. The origin of the term resides in psychology and psychiatry but became generalized into a term that stands for critical situation (Alshamaila et al. 2023).

Crises consist of mutually constructed societal values that are threatened and highlight the quality of a political system's relationship with the society (Cheng, 2016).

The COVID-19 pandemic was an unprecedented medical crisis that the world has bearly overcome with the help of advancements that took place mostly in the medical assistance field. It did not affect only the medical sector, but also the economy and society as a whole. It has imposed many regulations that had not been previously taken in order to restrain contagion and maintain a level of economic activity (Pollard et al. 2020).

Table 1. The concept of risk across various disciplines

Discipline	Concept	Framewok
Economics	Risk as a probability	Investment return, financial institutions
Sociology	• Risk as a feature of the modern society • The social amplification of risk • Risk management has to comprise multiple knowledge as scientific, political and public values • The importance of trust and personal experience in the public perception of risk and response	• Social and systemic risks from modernization • Risk of communication (media) in the interpretation of risks at the societal level • The perception of risk at the public level and the relationshop with the behavioral type responses
Anthropology	Risk affects the manner in which	Existent social structures impact

	responsability and blame are attributed	the perception of risks and beliefs
Psychology	Risk perception	The perception of risks and hazard in relation to the behavior of individuals and groups
Business and management	Risk as a management paradigm	Identification and control of the organizational risks, disaster risk management
Political science	Crisis decision-making	Decision-making by the intergovernamental organizations and nation states in a crisis
Disaster management and governance	Disaster crisis management	Disaster/emergency responses by organizations, adaptive governance for disasters
Organizational crisis management	Crisis planning and response	Crisis planning tools for managing organizational level crises

Source: adaption of the authors

Table 1 presents the concept of risk across multiple disciplines as economics, sociology and psychology. As shown above, risk as a concept has multiple interpretations in accordance with the discipline that approaches it.

According to Koichi Oizumi crisis management can be defined as the prediction and prevention of dangers that can occur unexpectedly regardless of the time and place and require initial actions in order to minimize damages (Kamei, 2019).

Another definition for crisis management belongs to Steven Fink who stated that this proccess encompasses the techniques to remove as many of the risks and uncertainties as possible and to control the outcomes of the situation (Fink 1986). Crisis management includes three stages as following: the pre-crisis phase which refers to prevention and preparation, the crisis phase which is the response and the post-crisis phase which is about learning and recovery.

Crisis management can be clearly defined as a set of factors that are designed to combat crises and to mitigate the damage inflicted by them (Coombs, 2017).

Risk management identifies any risks that may affect the profitability or functionality of the organization, evaluates the threats, implements the plans adopted following an accurate/exante risk analysis (Costan, 2019).

Risk assessment represents the core of the crisis management, following by the management plans which are the operating tools used to handle the specific crisis types (Zio, 2018).

In the social scieneces domain crisis is usually understood as a process that brings uncertainty as the case of risk and a state of urgency that has to be approached in order to reduce the negative outcomes. Like risk, crisis is focused on the social reaction on the event rather than the situation itself. So it is more about the reaction to the uncertainty phase than the phase itself. For example, the pandemic which was an unprecedented crisis shocked the entire globe and almost led to the collapse of the medical systems in several countries, however, not the situation itself scared the population than the measures that had to be taken in order to prevent contagion and outcomes that could not be predicted due to the nature of the event. Of course, pandemics occured in the past as well, but not at the level of the COVID-19 one which imposed several social constrains measures that have not been ever taken before. The crisis itself is a traumatic event, but by managing it, the attention is drawn rather towards the reactions of the governance than the event (Hassankhani et al. 2021).

Techonological advancements can be utilized to improve public safety, but also bring upon new challenges such as misinformation during a crisis via social media for instance. An optimized model for public safety can be developed with the help of artificial intelligence (Stranjik et al. 2024).

An example would be AI-powered video surveillance systems which can detect unusual events and timely alert the authorities on potential threats. Also, AI can analyze data very fast in order to identify potential risks and have a rapid response to emergency situations. In this way, safety risks will be easier to anticiapte and respond to, thus promoting a long-term safety and stability for the residents (Kashikar et al. 2024).

Artificial intelligence and machine learning techniques will change the risk management process by using predictive analytics and in this way improving the decision-making process.

AI emerged as an important digital technology for disaster risk management given to its evolution in image recognition, natural language processing (NLP) and robotic process automation (RPA). The use of AI based tools in improving the prediction and monitorization will lead to early warning in cases of emergency situations (Ogie et al. 2018).

Artificial intelligence can be used to predict a variety of crisis such as natural disasters with the help of ML and robotics, volcanic ash observation and water level prediction with the help of dedicated algorithms (Abid et al. 2021).

Another type of crisis that will benefit from AI and machine learning techniques is the financial one. AI-driven solutions will decide the amount of money that can be lend to a customer, be able to detect fraud and reduce the model risk (Shah, 2015).

In the case of risk management, machines are better than humans in analyzing situations and proposing relevant decisions to be made. Artificial intelligence is capable of analyzing and processing a large amount of data based on algorithms (Aladawi & Ahmad, 2023).

The 21st century has brought with it uncertainty, unpredictability and the introduction of disruptive technologies through the Fourth Industrial Revolution. These techological instruments impacted every aspect of life as we used to know from the economic pillar to the societal one.

The changes brought by them improved the decision-making process in various fields as governance and risk management.

Many events have marked the past period of time from a global pandemic, to wars to natural disasters and climate changes. Although humans are not able to control or predict most of them, they have the ability to take revelant measures in order to influence the outcomes of the negative events. Planning can play a significant role in responding to crises by rational application of knowledge and with the help of improved learning process. However, there is no universal approach nor startegy in finding a proper way of dealing with unpredictable situations. Learning by doing is a pragmatic strategy that had to be applied in the past events light in order to overcome them and to increase risk resilience (Harika et al. 2024).

Since the COVID-19 pandemic, technology deployment became a necessity in maintaing the well-being of humans. Well-being refers to numerous abstract meanings that in a philosophical way is used to determine the living conditions and space of individuals (Wang et al. 2021).

Healthcare and education are two of the most important aspects of individuals' well-being which were severely affected during the past pandemic that occured in 2020. In order to lessen the burden on the medical specialists, technological instruments such as telemedicine were implemented (Naudé, 2020).

Education also suffered from the restrictions imposed to constrain the COVID-19 pandemic and technology has also been proved useful in its case as well. E-learning or remote learning has

been introduced in order to keep social distance and to continue the educational activities with low degree risks (Almaiah et al. 2020).

Technology is able to increase social capital and civic participation, thus making disaster management more efficient. Social media has been used as a mean of communication during crises. It also analyzed the effectiveness as well as other aspects of crisis management tools (Reuter et al. 2018).

Today's disaster management is crucially improved by technology. The past pandemic experience shown that technological tools are useful in maintaing the economic activities as well as the well-being of humans.

Technology has improved different stages in crisis management from the increase of residents' participation, to enhancing governamental processes transparency, to maintain the functionality of the economic system and to improve the mental and physical health states of the residents (Ardito et al. 2021).

Although technology brings major benefits in crisis management, it also brings several challenges such as privacy issues, social inclusiveness, technical issues and misinformation. The challenges brought by crises can be difficult to address in certain types for example in unique crises and compunded ones (Krichen et al. 2023).

Timely recognition is the most important aspect in managing an emerging crisis state before it turns into an urgent threat. Governemnts have to collect and interpret data in a correct way and then communicate the results to relevant institutions. Threat has to be analyzed, understood and treated as a priority. In this way, cooperation between many organizations and decision makers is required (Saide & Sheng, 2020).

References

1. Abid, S.K., Sulaiman, N., Chan, S.W., Nazir, U., Abid, M., Han, H., Ariza-Montes, A. and Vega-Muñoz, A. (2021) Toward an Integrated Disaster Management Approach: How Artificial Intelligence Can Boost Disaster Management. *Sustainability* [Post-print], 13 (22), p. 12560. Available from https://doi.org/10.3390/su132212560.
2. Aladawi, A. S. A. R., & Ahmad, A. N. A. (2023). A Study of Factors Influencing the Adoption of Artificial Intelligence in Crisis Management. *International Journal of Sustainable Construction Engineering and Technology*, 14(5), 416-425. https://doi.org/10.30880/ijscet.2023.14.05.035

3. Almaiah, M.A., Al-Khasawneh, A. and Althunibat, A. (2020) Exploring the critical challenges and factors influencing the E-learning system usage during COVID-19 pandemic. *Education and Information Technologies* [Post-print], 25 (6), pp. 5261–5280. Available from https://doi.org/10.1007/s10639-020-10219-y.
4. Alshamaila, Y., Papagiannidis, S., Alsawalqah, H. and Aljarah, I. (2023) Effective use of smart cities in crisis cases: A systematic review of the literature. *International Journal of Disaster Risk Reduction* [Post-print], 85, p. 103521. Available from https://doi.org/10.1016/j.ijdrr.2023.103521.
5. Ardito, L., Coccia, M. and Petruzzelli, A.M. (2021) Technological exaptation and crisis management: Evidence from COVID-19 outbreaks. *R and D Management* [Post-print], 51 (4), pp. 381–392. Available from https://doi.org/10.1111/radm.12455.
6. Cheng, Y. (2016) How Social Media Is Changing Crisis Communication Strategies: Evidence from the Updated Literature. *Journal of Contingencies and Crisis Management* [Post-print], 26 (1), pp. 58–68. Available from https://doi.org/10.1111/1468-5973.12130.
7. Costan, L. N. (2019). The Objectives and Responsibilities of Risk Management. *Social Economic Debates,* vol. 8 (1), ISSN 2360-1973; ISSN-L 2248-3837. [online] https://www.economic-debates.ro/Art%206%20DSE%208%202019%20Costan.pdf
8. Coombs, W. T. (2017). Revising situational crisis communication theory: The influences of social media on crisis communication theory and practice. In *Social media and crisis communication* (pp. 21-37). Routledge.
9. Coombs, W.T. and Laufer, D. (2018) Global Crisis Management – Current Research and Future Directions. *Journal of International Management* [Post-print], 24 (3), pp. 199–203. Available from https://doi.org/10.1016/j.intman.2017.12.003.
10. Fink, S., & American Management Association. (1986). [book] Crisis management: Planning for the inevitable. Amacom.
11. Harika, A., Balan, G., Thethi, H.P., Rana, A., Rajkumar, K.V. and Al-Allak, M.A. (2024) Harnessing the power of artificial intelligence for disaster response and crisis management. *IEEE* [Internet], Available from https://doi.org/10.1109/ic3se62002.2024.10593506.
12. Hassankhani, M., Alidadi, M., Sharifi, A. and Azhdari, A. (2021) Smart City and Crisis Management: Lessons for the COVID-19 Pandemic. *International Journal of Environmental Research and Public Health* [Post-print], 18 (15), p. 7736. Available from https://doi.org/10.3390/ijerph18157736.
13. Kamei, K. (2019). Crisis management. Science of Societal Safety: *Living at Times of Risks and Disasters*, 141-150, https://library.oapen.org/bitstream/handle/20.500.12657/23274/1/1006882.pdf#page=147
14. Kashikar, A., Maurya, S., Gulhane, M., Vimal, V., Rakesh, N. and Kumar, M. (2024) The Impact of Artificial Intelligence on Crisis Management. In: *Lecture notes in networks and systems.* pp. 333–347.

15. Krichen, M., Abdalzaher, M.S., Elwekeil, M. and Fouda, M.M. (2023) Managing natural disasters: An analysis of technological advancements, opportunities, and challenges. *Internet of Things and Cyber-Physical Systems* [Post-print], 4, pp. 99–109. Available from https://doi.org/10.1016/j.iotcps.2023.09.002.
16. Naudé, W. (2020) Artificial intelligence vs COVID-19: limitations, constraints and pitfalls. *AI & Society* [Post-print], 35 (3), pp. 761–765. Available from https://doi.org/10.1007/s00146-020-00978-0.
17. Ogie, R.I., Rho, J.C. and Clarke, R.J. (2018) Artificial Intelligence in Disaster Risk Communication: A Systematic Literature review. *IEEE* [Internet], Available from https://doi.org/10.1109/ict-dm.2018.8636380.
18. Pollard, C.A., Morran, M.P. and Nestor-Kalinoski, A.L. (2020) The COVID-19 pandemic: a global health crisis. *Physiological Genomics* [Post-print], 52 (11), pp. 549–557. Available from https://doi.org/10.1152/physiolgenomics.00089.2020.
19. Reuter, C., Hughes, A.L. and Kaufhold, M.-A. (2018) Social Media in Crisis Management: An Evaluation and Analysis of Crisis Informatics Research. *International Journal of Human-Computer Interaction* [Post-print], 34 (4), pp. 280–294. Available from https://doi.org/10.1080/10447318.2018.1427832.
20. Saide, S. and Sheng, M.L. (2020) Knowledge exploration–exploitation and information technology: crisis management of teaching–learning scenario in the COVID-19 outbreak. *Technology Analysis and Strategic Management* [Post-print], 33 (8), pp. 927–942. Available from https://doi.org/10.1080/09537325.2020.1854714.
21. Shah, V.K. (2015) Artificial intelligence management in financial crisis. *IEEE* [Internet], Available from https://doi.org/10.1109/iccic.2015.7435807.
22. Stranjik, A., Kozlevac, D., & Turčić, I. (2024). Artificial Intelligence in crisis management. Crisis Management Days. Retrieved from https://ocs.vvg.hr/index.php/DKU/article/view/471
23. Zio, E. (2018) The future of risk assessment. *Reliability Engineering & System Safety* [Post-print], 177, pp. 176–190. Available from https://doi.org/10.1016/j.ress.2018.04.020.
24. Wang, L., Zhang, Y., Wang, D., Tong, X., Liu, T., Zhang, S., Huang, J., Zhang, L., Chen, L., Fan, H. and Clarke, M. (2021) Artificial Intelligence for COVID-19: A Systematic Review. *Frontiers in Medicine* [Post-print], 8. Available from https://doi.org/10.3389/fmed.2021.704256.