

Artificial Intelligence Based on Resilient Leadership in the Health Sector – A Secondary Publication

Elaine Bastidas Tapia*

Dr. Rafael Beloso Chacin University, Venezuela

**Corresponding author:* Elaine Bastidas Tapia, elainebastidas1@gmail.com

Copyright: © 2024 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: At present, it is impossible to deny the existence of artificial intelligence in various areas of social life, understood as the simulation of expert human intelligence from computer processes that involve learning, reasoning, and self-correction, its benefits to the medical field, in particular, are innumerable, but their incorporation into health systems has been gradual for many reasons. According to the above, this research analyzed artificial intelligence based on resilient leadership in the health sector, for which qualitative research was carried out with a documentary-bibliographic design with printed and electronic documentary sources with theoretical contributions from Ávila, Mayer, and Quesada ^[1], Morgan ^[2], Villa ^[3], and Finol ^[4], among others. It is highlighted that resilient leadership has become a strategic factor in all organizations, since times of uncertainty and changes lead institutions to properly manage the incorporation of technologies specifically AI, achieving in this way that the centers and professionals in the field of health assume the needs of the contexts and the innovations of the same. It is concluded that resilient leadership will allow artificial intelligence in the health sector to generate higher levels of learning and adaptability to the transformations that are necessary, whose resistance would make its application difficult and in the long run it will leave behind professionals who refuse to assume the contributions of these innovative techniques in medical practice.

Keywords: Artificial intelligence; Resilient leadership; Health sector

Online publication: April 29, 2024

1. Introduction

Technological advances in recent decades have impacted all activities carried out by humans, characterized by increasingly accelerated rhythms that lead societies to constantly incorporate new processes derived from technologies; consequently, innovation appears as a determining factor in all areas, meaning what was envisioned for the future is now a reality.

It is worth noting what has been termed artificial intelligence or AI, understood as the simulation of expert human intelligence through computer processes, involving learning, reasoning, and self-correction. It is estimated to have first appeared in 1956 when the American computer scientist John McCarthy conceptualized it at the Dartmouth Conference. Since then, it has become a discipline that is constantly innovating ^[5].

Although artificial intelligence may seem like something out of a science fiction movie, it is now part of the daily lives of citizens in many parts of the world, as it brings improvements in various processes. One of the fields in which AI appears as a panorama of highly useful applications is the healthcare sector, which is advancing rapidly based on the development of technological knowledge.

In this regard, Bohr and Memarzadeh ^[6] stated that AI presents a range of opportunities to address various issues in the healthcare sector, such as the demographic transition resulting from the aging of the world population, which has led to a higher incidence of chronic diseases: “The increase in life expectancy is accompanied by an increase in healthcare assistance.”

Likewise, one of the main global dilemmas is the lack of access to medical care. Cecco and Van Assen ^[7] reported on a World Bank and World Health Organization (WHO) report from 2017, which stated that 50% of the world’s population lacked access to healthcare services, with an accelerated aging of the population leading to an increase in chronic diseases in Latin America and the Caribbean. This leads to a greater need for healthcare services, infrastructure, and medical personnel to address the realities outlined.

In this context, the contribution that AI offers to healthcare centers worldwide is fundamental, as it creates strategies to increase population access to medical services. AI attempts to mimic human intelligence through the use of both soft and hard technologies, namely hardware and software, such as robots, and intelligent information systems, among others. This development allows machines to have the ability to think and reason on their own.

As stated by Cecco and Van Assen ^[7], “In the field of medicine, Artificial Intelligence (AI), along with other technologies, in addition to telemedicine, have the potential to facilitate universal access to health services by overcoming economic and geographic barriers.” Furthermore, it provides knowledge to practice medicine more accurately, which is an essential factor in medical sciences.

Moreover, the use of AI, in addition to task automation, assists with planning, diagnosis, and patient prognosis, making healthcare more efficient by not only reducing costs but also allowing for remote analysis of results, resulting in better distribution of healthcare services.

Despite the advances of AI in the world, the reality in Latin America and the Caribbean is different. Medical technologies are at a disadvantage compared to developed countries, where the most significant advances in this field can be observed. These range from preventive medicine practices, early diagnosis, personalized care, and even surgical interventions using robotics. In this way, healthcare systems optimize medical assistance, reduce costs to the states, improve resource distribution, and guarantee citizens’ right to health.

It is necessary to point out a juncture that put all areas of society, especially health, under strain: the emergence of the SARS-CoV-2 virus causing COVID-19. The sheer number of infected people and those in critical condition simultaneously overwhelmed even the strongest healthcare systems in the world, limiting the care for patients with other pathologies or chronic diseases. In this context, telemedicine experiences allowed, in many cases, to ensure healthcare for patients where in-person care would have been impossible.

However, it presented limitations at the time, partly due to the generational barriers of healthcare professionals, combined with the lack of competencies and knowledge about telemedicine and AI opportunities. Consequently, a concept emerges in the managerial sphere that is strategic for facing complex and uncertain situations: resilience, understood as the ability to adapt to adversity and recover, transforming it based on environmental requirements.

Thus, Villa ^[3] expressed that “resilience is understood as an effective way to face adverse situations, and resilient leadership is therefore applied in various social spheres as it is considered the most suitable for turning

unfavorable situations around.” In accordance with the above, resilient leadership became a strategic factor for the development of AI processes in the healthcare sector amid the COVID-19 pandemic.

Considering the aforementioned points, the objective of this research is to analyze artificial intelligence based on resilient leadership in the healthcare sector, understanding that the medical field was under great tension during these two years due to the pandemic. Therefore, advances in the application of artificial intelligence and telemedicine are of great help to expedite processes, marked by the ability to adapt and respond to social needs in times of crisis. Additionally, technological growth today is rapid.

2. Theoretical background

2.1. Artificial intelligence (AI)

AI allows automating processes that are done manually, thus admitting greater efficiency of procedures confidentially and without generating stress in people; the functioning of artificial intelligence largely depends on the algorithms and processes used to develop it or the objectives pursued with it, hence different types are identified.

It is estimated that it was Alan Turing who in 1950 consolidated the field of artificial intelligence with the article titled *Computing Machinery*, but it was in 1956 that the term was popularized at Dartmouth by John McCarthy, referring to the development of intelligent machines; from there, advances in this area have become increasingly innovative and astonishing.

In this regard, Rouhiainen ^[8] defined artificial intelligence as “the ability of machines to use algorithms, learn from data, and use what they have learned in decision-making as a human would,” adding as an additional benefit of AI that machines can handle larger volumes of data and do not require rest, thus becoming incorporated into social life as they have become a great benefit in multiple activities carried out by humans.

In this sense, different types or forms of artificial intelligence begin to appear. Arrollo ^[8], asserted that “there are different ways to make machines think,” highlighting different types of artificial intelligence described as follows:

- (1) Artificial Narrow Intelligence (ANI): This allows machines to perform tasks and jobs effectively but is considered inflexible because it does not adapt to any system; they are designed to perform specific functions, such as GPS.
- (2) Artificial General Intelligence (AGI): This technology seeks machines to possess the responsiveness of a human being; this type of intelligence aims to mimic human intelligence, with systems having generalized human cognitive abilities, enabling them to find solutions to tasks on their own.
- (3) Artificial Superintelligence (ASI): Considered one of the most advanced types of intelligence, it is estimated that it can mimic human behavior and even become conscious.
- (4) Reactive Machines: Known as the most basic, they make decisions about the present; they seek to reproduce human behavior when stimulated.
- (5) Limited Memory: Can store information collected over time, add it to their programming, and learn from the data by creating new patterns of behavior and predictive responses.
- (6) Theory of Mind: Consists of systems or machines whose AI allows them to understand how their environment works, the people, objects, and other systems around them, seeking to recognize human emotions and reflections.
- (7) Self-awareness: It is inferred that this type has not yet been reached because currently, there is no AI with awareness of its own existence.

As evidence, artificial intelligence is currently the greatest techno-scientific advancement for the world,

allowing processes to be developed as if a human were acting, making real decisions, using macro data to store information, and generating responses to immediate solutions.

However, some begin to see Artificial Intelligence as a purpose technology, so-called for its ability to transform broad sectors and perform the functions for which it is applied, to provide solutions, with the purpose of generating optimal, precise, efficient, and assertive products or services.

It is important to note that learning processes within Artificial Intelligence, Rouhiainen ^[8], stated “Machine learning is one of the main focuses of artificial intelligence. In short, it is an aspect of computer science in which computers or machines have the ability to learn without being programmed to do so,” characterized by the fact that less human intervention is required in processes every day.

In line with the above, advances in types of intelligence are of great importance in the health area, as it is based on the transformation of processes or the most powerful and innovative models, having the ability to understand with great efficiency the interactions to which it is exposed, which contributes to working in all medical disciplines and specialties in the health area, from a scientific, technical, and practical point of view.

Regarding this issue, Rodríguez ^[10] inferred that in the coming years, the development of new transformative technologies will be highlighted, such as quantum computing, virtual reality, next-generation networks, artificial intelligence, neural networks, robotics, user interfaces, understanding of the mind, productive health, and computers that match the brain’s raw processing power, making it possible for the vast majority of humanity to experience many things that are currently limited to a small group with immense data processing capacity.

Moreover, according to Mintz and Brodie ^[11], AI has begun to be incorporated into medicine to improve patient care by speeding up processes and achieving greater diagnostic accuracy, paving the way for providing better overall healthcare. Radiological images, preparations of pathological anatomy, and electronic medical records of patients are being evaluated using machine learning, aiding in the diagnosis and treatment process of patients.

Arrollo ^[9] pointed out that between 2020 and 2022, the global context of the pandemic and the need for non-presential medical care led to advances in Artificial Intelligence focusing on the healthcare sector, thus multiplying experiences and advances in this field.

2.2. Contributions of artificial intelligence to healthcare systems

In the healthcare sector, investment in AI has been increasing, which will improve access to healthcare in general, so that the population is not excluded either by age or health condition. For example, telemedicine is considered a wise choice for implementing AI when making diagnoses or monitoring health, according to the reports provided by physicians, achieving a greater impact on the most vulnerable society.

In this line of thought, Jiménez ^[12] can be cited, who states that “artificial intelligence is a tool that facilitates healthcare in an innovative, modern, dynamic, humane, and personalized way through the mechanisms of technologies that allow improvements in health,” from different areas that go beyond the diagnosis of pathologies.

It is imperative to note that currently Artificial Intelligence and telemedicine generate various contributions in healthcare that allow optimizing processes to guarantee management and healthcare assistance; thus, Cecco and Van Assen ^[7] highlighted three fundamental areas of action: “Administrative, for planning, scheduling, payments, and prescriptions. Chat-based assistance, through AI algorithms in conversational robots (chatbots), which recommend a diagnosis based on symptoms and patient health data and answer basic medical questions. Support for diagnosis or prognosis. AI helps examine a patient’s medical or health history data, provide care

recommendations, analyze disease patterns in the population, and automate some diagnostic processes.”

In line with the above, Ávila, Mayer, and Quesada ^[1] emphasized that there are projects and experiences currently beyond telemedicine dedicated to exploring the applications of AI in all healthcare facets: care (disease prevention, diagnosis, treatment, and patient monitoring), education or continuous training, research, and management. They highlight the following contributions of AI that have been fundamental:

- (1) Care: In this area, applications of artificial intelligence are diverse, from disease prevention and early diagnosis using computer programs that have been improving for the detection of various cancers, diabetes, and heart diseases, among others. In the precise diagnosis of pathologies, AI provides algorithms that allow reading complex patterns in image data using visual pattern recognition software, and each day the images become more precise. In treatments and surgeries, with applications that analyze the effectiveness of medications or with the surgical use of robots. Health monitoring and tracking are becoming increasingly simpler and more popular.
- (2) Education and continuous training: Teaching is another field that has benefited from the development of technology, the possibility of using simulations with great realism, the opportunity for teaching exchanges with distant centers, or witnessing surgeries using technologies.
- (3) Research: Research in the health area has been boosted by AI, reducing costs and providing results from other perspectives to the classics.
- (4) Management: Human talent and resource management have seen a great ally in AI due to the large amounts of data being handled, making it much faster and, of course, more productive.

It is worth noting that the advantages of AI applications are endless and appear more every day. It can be understood as technological development aimed at benefiting humanity, as these benefits seek to improve medical systems and overall health worldwide. It can be said that no branch of healthcare systems has been affected by the advances of artificial intelligence. That is why, Bohr and Memarzadeh ^[6] maintained that “telemedicine and remote monitoring have also experienced accelerated growth in recent times thanks to the greater availability of sensors, wireless technology, and the internet.” Likewise, machine learning brings great benefits in the field of health through the search for data patterns to understand situations of high complexity.

Regarding the disadvantages, Ávila, Mayer, and Quesada ^[1] pointed out that firstly, it would imply the replacement in many cases of humans by machines or robots, especially in those tasks that are linked to repetitive and everyday tasks, resulting in job losses. At the same time, it implies ethical dilemmas, as decision-making based on algorithms, although faster, does not take into account the various variables that humans go through: “...the calculating capacity of machines is much faster and more precise than humans, but there are non-numeric variables related to intangible aspects that machines are still unable to include in their decision-making processes.”

In relation to the above, Cecco and Van Assen ^[7] stated “It is important to consider the intrinsic risks of AI algorithms, especially when applied to a complex field such as health,” highlighting mainly two: the lack of interoperability, as AI algorithms produce decisions that are not always interpretable by medical personnel, leading them to assume that information; and a greater need for data found in different platforms and formats without an integrating data matrix that also guarantees data security.

Finally, another major disadvantage is linked to the socioeconomic inequities of nations, which will lead to these AI applications reaching citizens unevenly. Thus, in developed countries, these innovations will be implemented, while those in the periphery of the world will be excluded or arrive late. At the same time, within countries, per capita costs will lead to access by those who can afford this technology. Therefore, management and leadership in public and private healthcare systems are crucial to assume both the advantages and

disadvantages of AI.

2.3. Leadership

Since ancient times, the concept of a leader has been prominent in all societies. With the development of administration and managerial theory, emphasis begins to be placed on the role of the leader in organizations, due to their ability to influence the actions of the collectives that are part of the companies.

In line with the above, Lussier and Archua^[13] stated that “leadership is the process of influence between leaders and followers to achieve organizational objectives through change.” Thus, leadership begins to receive attention due to its capacity to achieve organizational objectives.

In view of this, along with leadership, another variable called “shared vision” appears, focused on the possibility for employees to assume the organizational vision as their own and work as a team based on it. It has been demonstrated the role that leaders play in generating this process. “Effective leaders influence followers to think not only about their own interests but also about those of the organization, through shared vision^[13].”

On this particular point, Mayorga *et al.*^[14] express that leadership is “the process of directing the work activities of group members; through communication, and influencing them; to achieve the goals of the company or organization.” From this definition, the role of communication and interaction in leadership processes is highlighted.

With the above, it is confirmed that leadership is one of the most important elements in management; however, it must be mentioned that the early leadership theories pointed to the idea that leaders are born, but that has changed and it is now proposed that it is possible to develop leadership from managerial skills, all this has led to the birth of theories that seek to promote or train leaders based on strategic competencies.

Ultimately, leadership can be understood as the ability to influence and motivate people based on a specific idea or project, and in this, personal abilities and skills are essential, as they allow for relationships and generate levels of empathy that are crucial for group cohesion processes.

In this line of thought, Mayorga *et al.*^[14] affirmed that leadership “...encompasses multiple personal qualities of utmost importance for a manager or executive; as it is based on interpersonal influence oriented towards achieving short-term (mission) or long-term (vision) goals; through communication.” Thus, individuals holding management positions must develop communicative and emotional intelligence skills that allow them to coordinate collectives strategically.

It is worth noting that different psycho-emotional aspects are beginning to become relevant in leadership, as the relationship between the people who make up work teams appears to be determinant in achieving the objectives of companies, from this reality and based on experiences, leadership approaches emerge.

However, Jiménez *et al.*^[15] referred to the fact that “Leadership was initially viewed individually, thus proposing styles according to the characteristics of the person; however, today leadership is approached from a global perspective, including the leader and his followers,” this has allowed a transition from notions of authoritarian and democratic leadership towards the development of new approaches.

Within this framework, Villa^[3] mainly highlighted three types of leadership by Bernard Bass: “*laissez-faire*, which is the non-leadership style, which negatively influences collaborators; transactional leadership, which shows positive results, and transformational leadership, which achieves the best results in its exercise.” In the *laissez-faire* approach, there is little involvement, giving freedom to the teams; while in the transactional approach, the leader operates based on the generation of incentives, and in the transformational approach, the leader achieves higher levels of influence on the team, even leading to the development of leadership and motivation capabilities in the team.

On the other hand, transformational leadership is seen as one of the most complex, yet effective, due to its positive impact on work teams. In the same vein, Jiménez *et al.* ^[15] emphasized that all organizations today must promote organizational leadership because it “...generates actions in its work team that motivate and transform each of the collaborators, fostering an adequate work environment, thus achieving the results foreseen by the company and aligning organizational objectives with personal ones.

In view of the above, it can be said that it is fundamental for leaders to promote openness to more communicative and flexible approaches, capable of adapting to different situations and contexts, with the intention that they can be effective in the decisions and relationships they generate in the exercise of their functions. In this context, it is necessary to refer to resilience as a novel concept in today’s organizations.

2.4. Resilient leadership

As expressed by Ramírez *et al.* ^[16], the need to adapt to changes has led to constant revision of leadership approaches and the skills necessary in leaders, among which resilience appears. This “term originated in physics and engineering in the study of materials, and refers to the ability of an element to, when hit or acted upon by external elements, return to its original state.”

In this same context, the concept of resilience expanded to other areas of action such as ecology due to the ability of certain ecosystems to regenerate, and later transferred to social sciences, to explain how individuals and social groups have the ability to recover from extreme situations and, from there, build alternatives to address conflicts.

Furthermore, it should be noted that leadership theories have been transforming into more flexible and change-oriented approaches, in which communication skills have absolute preponderance, especially due to the volatile nature of contexts and the acceptance of uncertainty as part of organizational life. Thus, the notion of resilience emerges as a strategic aspect of leadership.

From this perspective, Villa ^[3], analyzing resilience in leadership, expressed that “the concept of ‘resilience’ can be defined as the competence that certain individuals achieve to face difficult and discouraging situations, with positive responses that allow them to emerge successfully or redirect the situation without being overwhelmed, looking to the future with optimism.”

On another note, changes in managerial sciences have adapted to new concepts that are part of the world today, such as complexity and uncertainty, which require new skills in leaders, and resilience appears as a notion that allows managers to accept that organizations and their processes are not linear, but rather dynamic and affected in multiple ways by internal and external factors.

Therefore, resilience is now valued as an essential skill for 21st-century leaders, it is understood as “a personal trait that individuals develop throughout their lives, and which many authors link to factors such as self-esteem, independence or autonomy, interpersonal relationships, sense of humor, commitment, locus of control, personal or professional challenges, among others” ^[3].

Likewise, resilience is constituted as a trait linked to the capacity to face unplanned situations and create scenarios that benefit the organization, therefore, this quality in a leader is fundamental. “The review of the studies and research examined allows us to conclude that resilient leaders are needed in any type of organization. People trained in leadership and with resilient personal characteristics are required, capable of promoting changes and innovations...” ^[3].

Similarly, there are several advantages that resilient leadership offers to the organization, “... resilience implies the ability to achieve mental and emotional balance in adverse circumstances, facing them through perseverance, decision-making, self-confidence, generating a positive environment that encourages the

integration of its members in search of shared emotional equity”^[4]. As perceived, resilient leadership tends to be articulated to understand and strategically address the complexity of organizations and the contexts in which they are immersed, in addition to the ability to adapt to changes by promoting spaces that overcome individuals’ resistance and rather motivate them to positively embrace challenges.

It is important to note that with advances in information and communication technology, organizational changes are becoming increasingly accelerated and profound, as they involve major disruptions in production processes. Therefore, administrative management and the capacities for managing human talent from resilience are crucial to effectively address them. As Ramírez *et al.*^[16] stated: “When discussing the contributions of resilient leadership theories to human talent, these are oriented towards strengthening techno-knowledge, ethical awareness, transfer of meaningful learning, value of intellectual capital, transformation processes, human talent management, favorable environmental conditions, balancing the impact of traumatic situations, resonant leadership, growth and development of the resilient leader as a talent-enhancing competence, resilience in the face of adversity, and adaptability, which socially impacts management in organizations, and the actions of people in their lives.”

However, the strengthening of techno-knowledge has been one of the main dilemmas in organizations because technologies and artificial intelligence lead to a break in the logic of processes that is not always positively embraced by members of organizations, and the ability of resilience makes the difference, especially in the healthcare sector.

2.5. Resilience in health professionals in times of uncertainty

It is worth noting that healthcare centers are complex organizations due to the various immediate situations that unfold in their daily operations, and resilience becomes an essential skill for all professionals working in these organizations, which should lead to an understanding that uncertainty is part of the culture in these spaces.

As a result, Morgan^[2] stated that “a resilient collaborator owns their emotions. When facing a crisis, they largely control their reactions and channel them towards solving the problem, instead of getting caught up in an emotional reaction.” This is crucial in the healthcare sector, where the use of resources and strategic analysis of alternatives can even involve saving a life, so decision-making must be done with emotional control.

On the other hand, Gonçalves and Sala^[17] pointed out that “health centers are characterized by high uncertainty, diversity, and complexity where the study of organizational resilience is pertinent.” Hence, the literature highlights works on resilience in various healthcare professionals such as nurses or doctors, as they must achieve emotional control due to the activities they perform, while also addressing the demands of the environment.

The importance of resilient leadership in healthcare organizations is even greater than in other organizations, as it implies the possibility of having personnel capable of controlling their emotions in any context, working cohesively with the team and organizational goals, and being motivated in the development of their tasks and daily activities.

In line with the above, Moreno’s study^[18] highlighted evidence that resilient leadership in the healthcare sector personnel “contributes to transforming organizations into strong and committed institutions and inspires the achievement of innovative goals, leaving behind uncertainty and instability, to transition to developing competent, stable work environments with a positive and overcoming attitude,” thus building an organizational culture that promotes it.

To conclude, it is necessary to establish strategies to promote resilient leadership, as it means addressing the mental-emotional health of the staff, which will have a direct impact on patients and the organization itself.

“The leaders of healthcare organizations must be aware that a limited vision of the psychological safety of their workers could negatively impact patient safety, health, and staff retention, even beyond the pandemic”^[17].

Based on the above, the healthcare sector, in general, should promote programs aimed at training all staff in basic aspects to exercise resilient leadership, which not only aims at substantial individual improvement but also the institution, allowing for effective transition towards organizational transformation resulting from the incorporation of technological innovations in processes.

3. Discussion

3.1. Artificial Intelligence based on resilience in healthcare centers

Within this framework, as has been evidenced, society is undergoing rapid changes, some authors like Morgan^[2] has termed it the fourth industrial revolution, guided by technology, and AI is transforming all areas of social life, including the medical sector, which demands new skills from healthcare workers, and resilient leadership emerges as crucial to confront these new realities.

“Technological changes will generate significant transformation in the workplace in the coming years, as a result of the fourth industrial revolution. Human beings, as the main asset of an organization, are already facing consequences in that regard.”

Furthermore, Morgan^[2] also pointed out that “this revolution will bring about job losses, but on the other hand, it will generate millions of new opportunities, only different and exclusively for those who possess the appropriate skills and training. Industries and disciplines will merge.” Resilient leadership is essential for individuals and organizations, as they embrace changes and new learning processes without resistance.

In this same context, this research focuses on the analysis axis, because while it is true that the fourth industrial and technological revolution centered on AI is bringing about significant changes in the healthcare sector, resilient leadership understood as the ability to adapt and transform makes the difference between those who will lag behind and those who will drive the individual and organizational changes that come with it.

Therefore, Jiménez^[12] highlighted that “there are people with resistant attitudes to working with Artificial Intelligence due to the fear that machines may eventually replace humans since technologies could perform up to half of the human activities.” In this sense, resilient leadership can become a strategy to overcome these barriers that ultimately limit or delay the advances and benefits that AI can offer to the healthcare sector.

It is essential to note that currently, the use of AI in the healthcare sector, both public and private, is a reality. However, experiences are mostly linked to the levels of development of countries, as they involve investment in technology and innovation. Despite this, experiences such as telemedicine can be found in any country in the world. The contexts of change and uncertainty have led healthcare professionals to innovate by incorporating communication technologies into their daily lives, where leadership skills have been crucial in driving cultural change among healthcare professionals.

Consequently, embracing the contributions offered by AI to healthcare professionals implies resilient leadership, strengthening human talent towards training in techno-knowledge, ethical awareness, transfer of significant learnings, and adaptability^[16]. This should lead to the understanding that AI innovations do not come to replace human personnel per se, but also to be clear that professionals who do not embrace change will be left behind.

Resilient leadership provides skills to embrace change in the organizational culture that the healthcare sector requires to transform amid the so-called fourth industrial revolution, which will enable the promotion of various advances proposed by AI. Adaptability to changes will become key. It is necessary to understand that in many cases, the incorporation of new processes involves true transformations of established logic,

such as in-person consultation. Therefore, resilient leadership offers healthcare professionals tools to embrace uncertainty and the impossibility of refusing that symbiosis of human talent and technology from a productive and innovative perspective.

On the other hand, AI in resilient leadership in the healthcare sector requires a new understanding of learning processes and the paradigm shift, as knowledge is no longer static, but in constant transition. “Human resources require preparation, resources for the use of artificial intelligence, and facing existing challenges.” [12].

Resilient leadership can offer the healthcare sector the tools to effectively incorporate the transformations brought about by AI in all processes. It is essential, first and foremost, to understand learning as part of everyday life; even unlearning is necessary to challenge generational barriers that produce fear of technology and resistance to change.

The challenge lies in answering how a transition is made, from training, public job offerings, cultural changes, training plans, and the new role of public health employees, at certain times in the incorporation of artificial intelligence. The implementation of an artificial intelligence system adapted to the needs of the public sector will be ineffective if citizens and healthcare personnel do not have the necessary techniques to carry out its execution [19].

On the other hand, it is necessary to understand that the importance of resilient leadership in the incorporation of AI in the healthcare sector lies in the fact that this process requires not only technical skills, as one might think, but also entails a cultural change in the logic of work; therefore, soft skills and resilience are essential. Hence, the resilient leader must not only possess assertiveness in decisions about AI technologies based on the needs of the environment but also ensure that their teams effectively incorporate these processes to offer citizens all the benefits they provide.

Furthermore, it is worth highlighting that these processes will not occur in linear contexts but, on the contrary, will be filled with divergent dynamics, hence the importance of organizational resilience, “understood as the organization’s capacity to survive and even strengthen in times of crisis” [17].

It can be said that AI in the healthcare sector requires skills that enable mental and emotional balance in circumstances of change, which involve decision-making in new situations and will result in new learning and adaptation processes. Thus, healthcare centers and professionals who are fostering resilient organizational cultures excel in incorporating innovations that technological advancements in AI are offering to the healthcare sector and make a difference.

4. Methodology

An investigation was conducted with a documentary-bibliographic design, where the findings from selected printed and electronic documentary sources were collected and analyzed based on the studied variables: artificial intelligence in the healthcare sector and resilient leadership [20].

5. Conclusions

In conclusion, this research suggests that it is no longer possible to deny the incorporation of AI into multiple aspects of everyday life, especially in the healthcare sector. These advancements have been gradually integrated into contexts for various reasons, but undoubtedly one of the important factors contributing to the progress of experiences is resilient leadership, understood as the ability to confront uncertainty, needs, and existing potentials.

In this regard, resilient leadership has become a strategic factor in all organizations, as times of uncertainty

and change necessitate institutions to manage adaptability to technologies and Artificial Intelligence specifically effectively. This ensures that healthcare centers and professionals embrace the needs of contexts and the innovations that AI offers to the healthcare sector.

It is important to highlight that resilient leadership, through AI in the healthcare sector, will enable higher levels of learning and adaptability to necessary transformations. Resistance to these changes hinders their application and will ultimately leave behind professionals who refuse to incorporate the contributions of Artificial Intelligence into their processes and medical practice.

In conclusion, AI is an innovation applicable to all processes and events, where resilient leadership will play a crucial role and will change many of its “hard” aspects, such as decision-making, while also impacting more on the “soft” aspects, such as helping to solve everyday problems with precision, simulating the human mind, and considering that these systems are programmed by humans. Additionally, leaders will also have to consider how to promote collaboration between workers and AI systems, thereby elucidating the challenges institutions will face in this healthcare scenario.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Ávila J, Mayer M, Quesada V, 2021, La Inteligencia Artificial y sus Aplicaciones en Medicina II: Importancia Actual y Aplicaciones Prácticas [Artificial Intelligence and Its Applications in Medicine II: Current Importance and Practical Applications]. *Atención Primaria*, 53(1): 81–88. <https://doi.org/10.1016/j.aprim.2020.04.014>
- [2] Morgan J, 2020, La Resiliencia: Habilidad Esencial Para Hacerle Frente a la Cuarta Revolución Industrial [Resilience: Essential Skill to Cope with the Fourth Industrial Revolution]. *Rev Nac Adm*, 11(1): 21–31.
- [3] Villa A, 2020, Liderazgo Resiliente Pertinente Para Una Sociedad Cambiante [Resilient Leadership Relevant to a Changing Society]. *Foro Educativo*, 2020(34): 77–103.
- [4] Finol M, 2019, Liderazgo Resiliente Ante Escenarios Prospectivos [Resilient Leadership in the Face of Prospective Scenarios]. *Revista de Investigación Sigma*, 6(1): 28–39. <https://doi.org/10.24133/sigma.v6i01.1259>
- [5] Rouse M, 2021, Qué es Inteligencia Artificial, o AI? [What is Artificial Intelligence, or AI?]. Definition and WhatIs.com, TechTarget, viewed November 25, 2022. <https://searchdatacenter.techtarget.com/es/definicion/Inteligencia-artificial-o-AI>
- [6] Bohr A, Memarzadeh K, 2020, La Asistencia Sanitaria Actual, Datos Masivos y el Aprendizaje Automático [Today’s Healthcare, Massive Data and Machine Learning], in *Inteligencia Artificial En El Ámbito de la Salud [Artificial Intelligence in Healthcare]*. Elsevier, Spain.
- [7] Cecco C, Van Assen M, 2022, Inteligencia Artificial y Telemedicina en el Sector de la Salud [Artificial Intelligence and Telemedicine in the Health Sector]. Development Bank of Latin America, viewed November 25, 2022, <https://mail.google.com/mail/u/1/ogbl#inbox/FMfcgzGqRZfBNmRTjbfSRjghXXKPJJWS?projector=1&messagePartId=0.1>
- [8] Rouhiainen L, 2018, Inteligencia Artificial [Artificial Intelligence]. Editorial Aliente, Spain.
- [9] Arrollo J, 2022, Fundamentos Básicos de NVIDIA Jetso Nano [NVIDIA Jetso Nano Basics]. SERVICEPOINT, Spain.
- [10] Rodríguez P, 2018, Inteligencia Artificial: Cómo Cambiará el Mundo y tu Vida [Artificial Intelligence: How It Will Change the World and Your Life], viewed December 6, 2022, <https://espacio.fundaciontelefonica.com/evento/inteligencia-artificialcomo-cambiara-el-mundo-y-tu-vida/>

- [11] Mintz Y, Brodie R, 2019, Introduction to Artificial Intelligence in Medicine. *Minim Invasive Ther Allied Technol*, 28(2): 73–81. <https://doi.org/10.1080/13645706.2019.1575882>
- [12] Jiménez HLG, 2021, Inteligencia Artificial Como Potencia de Herramienta en Salud [Artificial Intelligence as a Tool Power in Artificial Health Information for Health Care Managers]. *INFODIR*, 17(36): 1–30.
- [13] Lussier RN, Achua CF, 2011, Liderazgo. Teoría, Aplicación y Desarrollo de Habilidades [Leadership: Theory, Application, and Skill Development]. Thomson Learning, Mexico.
- [14] Mayorga F, Arias D, Mayorga I, et al., 2019, Liderazgo: Una Habilidad Gerencial Fundamental en el Éxito de una Empresa en el Siglo XXI [Leadership: A Fundamental Managerial Skill in the Success of a Company in the 21st Century]. *RECIMUNDO*, 3(3): 1061–1084.
- [15] Jiménez A, Gómez D, Rendón J, et al., 2020, Revisión del Liderazgo, sus Estilos y Modelos de Medición en la Última Década [Review of Leadership, Its Styles and Measurement Models in the Last Decade]. *RHS*, 8(1): 81–98.
- [16] Ramírez R, Lay N, Avendaño I, et al., 2018, Liderazgo Resiliente Como Competencia Potenciadora del Talento Humano [Resilient Leadership as an Empowering Competence of Human Talent]. *Revista de Ciencias Humanas y Sociales*, 34(86): 826–854.
- [17] Gonçalves L, Sala R, 2022, Importancia de la Resiliencia Individual y Organizacional para la Salud Laboral del Personal Sanitario [Importance of Individual and Organizational Resilience for the Occupational Health of Healthcare Personnel]. *Revista de la Asociación Española de Especialistas en Medicina del Trabajo*, 30(2): 151–160.
- [18] Moreno M, 2022, Hacia la Transición a un Liderazgo Empoderado y Resiliente en los Profesionales de Enfermería [Toward the Transition to an Empowered and Resilient Leadership in the Nursing Professionals]. *R Aquichan*, 22(4): e2241. <https://doi.org/10.5294/aqui.2022.22.4>
- [19] Segovia A, 2021, El Reinicio Tecnológico de la Inteligencia Artificial en el Servicio Público de Salud [The Technological Reboot of Artificial Intelligence in the Public Health Service]. *IUS ET SCIENTIA*, 7(1): 327–356.
- [20] Ñaupas H, Mejía E, Novoa E, et al., 2014, Metodología de la Investigación Cuantitativa – Cualitativa [Research Methodology. Quantitative – Qualitative]. Ediciones de la U, Colombia.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.