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Review Article

Neuroleadership in Twenty-First-Century Education: A Systematic Review

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Abstract

In today's volatile and interconnected world, characterized by economic uncertainty, competitiveness, and constant demands for transformation, organizations are challenged to adapt effectively to new requirements. This study presents a systematic review of 31 peer-reviewed articles published between 2014 and 2025 that examine neuroleadership in both managerial and educational contexts. The review offers a comprehensive framework that links leadership challenges with organizational strategies designed to transform work and academic practices. Findings highlight the benefits of neuroleadership in enhancing emotional well-being, engagement, decision-making, organizational resilience, and the development of both cognitive and emotional skills, as well as sustainability. The evidence further underscores the need to cultivate leaders who are capable of managing teams with empathy and strategic insight, thereby fostering more adaptive and human-centered workplace cultures. Overall, neuroleadership emerges as an innovative and essential paradigm for twenty-first-century leadership, rooted in cognitive processes and focused on the holistic development of human talent. Its successful implementation requires strategic vision, specialized training, and organizational commitment to address emerging challenges.

Keywords:

Neuroleadership;
Neuroscience;
Emotional Regulation;
Cognitive Processes;
Decision-Making;
Organizational Resilience.

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1- Introduction

Organizations increasingly recognize that leaders provide unique value to institutional development. However, traditional leadership approaches have proven insufficient in a world characterized by unlimited access to information and constant demands for change. Contemporary research portrays leadership not as a simple linear process, but as a far more complex and multifaceted phenomenon. Within this context, the present review underscores the relevance of an emerging paradigm: neuroleadership [1].

Over recent decades, major advances in technology have significantly deepened neuroscientific understanding of the human brain. Innovative contributions in neuroanatomy, synaptic development, and brain functioning have transformed not only how the brain is understood, but also how leadership itself is conceptualized. According to Rock et al. [2], leaders who harness the capacities of their own brains, as well as those of their followers, are able to improve engagement and performance. Similarly, Henson & Rossouw [3] argued that leadership effectiveness increases when individuals strengthen cognitive resilience, cultivate healthy habits and relationships, and foster high-quality collective thinking [1].

These insights reveal how neuroscience opens new avenues for understanding leadership. Emerging evidence demonstrates that underlying brain processes shape decision-making, emotional regulation, and adaptability to change. Because the brain possesses the capacity for neuroplasticity, leaders are able to develop greater flexibility and

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responsiveness. This aligns with the demands of the so-called VUCA environment (volatile, uncertain, complex, and ambiguous) where effective leadership requires openness to collaboration, rapid adaptation, and the capacity to act despite incomplete information. As Krawchuk [4] suggested, twenty-first-century leaders must be comfortable with ambiguity, pivot quickly as circumstances evolve, and continuously recalibrate their strategies [1].

Academic interest in neuroleadership has expanded considerably in recent years [5]. Defined as a neuroscience-based leadership approach, it seeks to positively influence human behavior by grounding leadership practices in neural mechanisms and strategic management principles a field increasingly known as neurostrategy. This discipline explores the interaction between cognitive and integrative neuroscience tools and their application in social, cognitive, and emotional contexts, providing deeper insights into how the brain shapes leadership [6]. For this review, scientific literature was retrieved primarily from Scopus, EBSCO, and Dialnet Plus databases.

The organizational framework of neuroleadership rests on four key dimensions: decision-making and problem solving, emotional regulation, effective collaboration, and facilitation of change [7]. Neuroleaders are thus distinguished by their ability to understand brain functioning, optimize task management, and create a positive impact within their professional environments [6]. Fundamentally, neuroleadership aims to enhance leadership effectiveness by aligning practices with brain physiology. Within educational contexts, this understanding allows the design of conditions that support student success [1].

In an increasingly complex and chaotic environment (marked by intensifying market competition, economic volatility, globalization, and relentless pressures for change), educational systems face the urgent task of preparing students to adapt effectively to emerging demands [6]. Educational leadership must therefore rely on essential skills of communication, persuasion, human relations, and negotiation. These abilities form the foundation for establishing the minimum organizational conditions necessary for the effective pursuit of institutional objectives. Such conditions manifest in greater job satisfaction, a healthy organizational climate, high levels of motivation, and, consequently, in commitment and responsibility grounded in strong ethical and moral principles [8], yet, if students are unable to translate their academic talent into the concrete skills and knowledge demanded by new forms of employment, their academic preparation will prove insufficient, restricting their future employability [9]. This challenge makes it imperative to broaden our perspectives and integrate emerging leadership paradigms into education [1].

Several factors illustrate the urgency of this shift. First, there is a persistent disconnect between cognitive and emotional processes in educational management, highlighting the need for leaders capable of making brain-informed decisions, motivating teachers, and managing teams effectively [10, 11]. Second, educational institutions often operate in contexts of uncertainty, conflict, and risk, which demand adaptive leaders capable of managing stress and fostering positive organizational climates [12]. Third, deficits in communication, motivation, and emotional management persist, as leaders frequently lack strategies to foster effective communication and manage emotions constructively factors that directly affect educational quality [13]. Finally, there is a growing demand for evidence-based leadership grounded in neuroscience, which provides essential insights into motivation, decision-making, and emotional intelligence, all of which are critical for effective and transformative educational leadership [10, 11].

This study therefore poses the following research problem: How has neuroleadership been addressed in twenty-first-century academic literature within the context of higher education, and what are the key trends, applications, and implications for cognitive processes in strengthening student competencies and workplace performance?

The main objective of this research is to assess the value of integrating neuroleadership into education by conducting a systematic review of the literature, Neuroleadership is presented here as a crucial tool to enhance the intellectual and emotional dimensions of leaders. Importantly, it must be personalized to the unique neurological profile of each student, thereby transforming higher education into a brain-based, student-centered learning experience. Such an approach enables students to recognize challenges, unlock their potential, and strengthen executive functions such as cognitive flexibility and emotional regulation skills that are indispensable for adapting to dynamic social and professional environments.

This study makes a novel contribution by offering an integrative and systematic analysis of neuroleadership, combining bibliometric, comparative, and conceptual perspectives to identify trends, objectives, benefits, and challenges in organizations. Unlike earlier research, which often focused narrowly on theoretical aspects or case-specific applications, this review simultaneously incorporates cognitive, emotional, and strategic dimensions. The synthesis of findings generates practical guidelines for leaders and managers, reinforcing both the scientific foundations and the applicability of neuroleadership in contemporary organizational settings [14].

Although the emphasis is placed on higher education, the findings are broadly transferable to corporate and public organizations, since competencies associated with neuroleadership such as decision-making, emotional management, and teamwork are transversal across educational and professional domains. Unlike previous reviews that centered on organizational contexts or educational management alone, this study focuses specifically on higher education students preparing to enter the labor market. By linking empirical findings with the development of professional and socio-emotional competencies, the review provides an original perspective on neuroleadership within higher education, a field still underexplored in the literature.

2- Theoretical Background

2-1- Neuroleadership

We live in an era of constant change and discovery, where neuroscience has begun to make significant contributions to education and leadership. When applied to leadership, neuroscience has given rise to the concept of neuroleadership, which connects people management with the neural basis of leadership. It focuses on how brain processes shape behavior, emotional intelligence, decision-making, social interactions, and motivation, thereby influencing not only the leader but also all members of an organization. Braidot [15] argued that since the 1990s often referred to as the "decade of the brain" organizations and neuroscience specialists have worked together to drive profound change in management practices [16].

The term neuroleadership first appeared in the Harvard Business Review in 2005. A year later, Rock and Schwartz published the article The Neuroscience of Leadership, in which they formally introduced the concept. They defined it as a discipline that integrates insights from neuroscience (the brain and its processes) to explain the neural foundations underlying leadership, human behavior, decision-making, motivation, emotional intelligence, social interactions, and both individual and collective learning. These elements are regarded as central to fostering enriching and positive organizational environments [12]. Neuroleadership is rooted in Self-Determination Theory (SDT) and operationalized through the SCARF model (Status, Certainty, Autonomy, Relatedness, and Fairness). The model incorporates SDT's core psychological needs competence, relatedness, and autonomy which, according to Deci et al., are essential for optimal human development [17].

According to Rock, neuroleadership is structured around five critical dimensions: (a) status, or the value assigned to individuals within society; (b) certainty, or the ability to anticipate the future; (c) autonomy, or the sense of control over events; (d) relatedness, or expectations of security in relationships with others; and (e) fairness, or the perception of justice and reciprocity in interactions [18].

Goleman & Richard Boyatzis [19] further suggested that effective leaders activate powerful neural systems of social interconnection. They described this as social intelligence: a set of interpersonal competencies grounded in specific neural circuits (and related endocrine systems) that inspire others to perform effectively. Similarly, Henry Mintzberg emphasized that neuroleadership centers on how individuals in social environments make decisions, solve problems, regulate emotions, collaborate with others, and facilitate change. Arana added that neuroleadership represents a new paradigm for thinking, deciding, and acting in leadership, both individually and organizationally. From this perspective, the challenge of neuroleadership is to understand how the brain works in order to channel leadership, build effective teams, make sound decisions, and inspire motivation. As Braidot has argued, the necessary tools are not external but reside within each individual [20].

Braidot [15] also contended that neuroleadership aspires to define the neural basis of leadership and management by examining the brain processes that explain individual behavior, motivation, decision-making, emotional intelligence, interpersonal relations, cognition, and learning. These aspects are directly connected to organizational life and leadership practice.

Like other disciplines, neuroleadership has distinct domains of application. Atencio et al. (2019) noted that its focus lies particularly on emotional and intellectual factors when they intersect with decision-making, problem solving, teamwork, creativity and innovation, motivational processes, emotional regulation, and both individual and organizational learning. As Araba (2012) explained, these domains represent the spaces where neuroleadership interprets and translates neuroscientific discoveries into practical methodologies, models, and tools for institutional application [20].

2-2- Theory Underpinning Neuroleadership

2-2-1- Self-Determination Theory (SDT)

Self-Determination Theory (SDT) provides a detailed account of the intrinsic motivational factors that underpin leadership success. Neuroleadership draws directly on SDT's three core dimensions autonomy, relatedness, and competence to strengthen leadership theories and practices. As Deci and Ryan emphasize, SDT offers a conceptual bridge between leadership studies and Organizational Neuroscience (ON). Central to SDT is the process of internalization, whereby motivation becomes self-regulated and integrated into personal values and behaviors. This internalization is facilitated through two key mechanisms: self-regulation and social context. Depending on how motivation is internalized, individuals exhibit different attitudes and behaviors [21, 22].

Unconscious triggers that shape behavior outside of deliberate awareness can often lead scholars and practitioners to misinterpret workplace conduct and its causes [22]. Neuroscience helps illuminate these implicit mechanisms by examining how brain networks operate at both primary and complex levels. For instance, Becker, Cropanzano, and Sanfey argued that neuroscience is uniquely positioned to reveal the implicit processes within the brain, while Waldman and colleagues proposed an integrated model combining neuroscience and moral psychology to explain the ethical reasoning of leaders [17].

Rock suggested that examining leadership through neurological studies can illuminate how intrinsic motivation and internalization operate core principles of SDT that are also central to neuroleadership. This perspective incorporates the three SDT dimensions: competence, relatedness, and autonomy. Competence is linked to cognitive, motor, and social development; relatedness constitutes a motivational state that strengthens the internalization of values and ensures more effective transmission of collective knowledge, thereby fostering more cohesive social organizations; and autonomy reflects the individual's capacity for self-regulation and for maintaining coherence in behavioral goals [21]. Viewed through the lens of SDT, neuroleadership thus becomes a framework that connects psychological theories with organizational neuroscience, offering a pathway to refine and extend contemporary leadership models [17].

Leadership research has been grounded in a wide range of theoretical perspectives. Approaches such as transactional leadership, servant leadership, and resonant leadership all share a fundamental concern: the satisfaction of basic psychological needs. When these needs are fulfilled, they translate into job satisfaction, motivation, and overall employee well-being. Gómez-Baya and Lucía-Casademunt further emphasized that individuals' internal resources such as their potentialities, capacities, and sensitivities are critical for personal growth, group integration, and active engagement in the demanding tasks of the workplace. Thus, both the cultivation of internal resources and the satisfaction of basic needs are essential for building successful organizational environments. Among the many theories addressing these needs, Self-Determination Theory (SDT) is the most widely cited, and it has gained increasing importance as a framework for enhancing work effectiveness in organizational contexts [12, 14] .

Deci, Connell, and Ryan argued that fulfilling the psychological needs of competence, autonomy, and relatedness is indispensable for optimal human development. SDT holds that these needs are universal and must be understood as "innate psychological nutrients" essential for continuous growth, integrity, and well-being [21]. The absence of any of these needs has profound consequences, undermining core aspects of human psychology. In other words, when competence, relatedness, and autonomy are not adequately supported, the deepest foundations of human functioning are compromised [12, 14].

Gagné & Deci also traced SDT's foundations to natural processes that regulate intrinsic motivation and internalization. They maintained that people must experience competence and autonomy in order to sustain intrinsic motivation. To strengthen individuals' motivation to learn and develop, their basic psychological needs (competence, autonomy, and relatedness) must be met. According to SDT, openness to experience, curiosity about the environment, and an interest in learning are essential conditions for effective adaptation to new and constantly changing circumstances. Conversely, when individuals derive no satisfaction from learning new things on their own, they are less likely to activate their full potential and to develop the skills required to adapt to evolving environments [17, 21].

2-2-2- SDT Theory and Neuroleadership

The contribution of Self-Determination Theory (SDT) to the study of neuroleadership can be observed in two principal domains: the behavioral rapport of the leader and the motivational dynamics of the follower. Both domains engage mechanisms that operate not only at the conscious level but also through unconscious processes that structure human conduct [21]. The researchers also argued that the satisfaction of relatedness and competence is decisive for the internalization of values and norms. Autonomy, however, determines the degree to which this internalization is consolidated and translated into effective behavioral regulation. Thus, the extent to which an individual achieves autonomy directly conditions the coherence of goal-directed action. Neuroscientific methodologies offer a privileged means of examining these processes, as they reveal the neural substrates that underpin autonomy, internalization, and motivation within leadership contexts [17].

2-3- Organizational Neuroscience

Neuroscience elucidates the dynamics of brain networks and the ways in which behavior emerges from their activity. When integrated with organizational studies, it generates a distinctive interdisciplinary domain for investigating workplace conduct. Its appeal lies precisely in its capacity to clarify intrinsic neural mechanisms rooted in primary brain systems and to trace their implications for higher-order cognition and behavior. Hughes and Zaki, for example, applied this perspective to the study of motivation, demonstrating how it shapes cognition, self-perception, perceptions of others, and intergroup relations [12].

Becker, Cropanzano, and Sanfey further emphasized that research into the brain's cognitive systems particularly the intrinsic mechanisms underlying behavior substantially extends the explanatory reach of organizational behavior and industrial psychology [12].

Organizational neuroscience thus emerges as a multidisciplinary field encompassing neuroscience, organizational and cognitive psychology, management science, and neuroeconomics. As Becker et al. argue, this synthesis enables management scholars to illuminate the antecedents of employee behavior by clarifying the processes of neural activation. In this respect, neuroscience provides refined accounts of brain networks and deepens understanding of the relationship between cognition and behavior [12].

Scholars have progressively moved beyond cognition to address the affective dimensions of organizational behavior. Beugré conceptualized organizations as arenas of affective production, in which employees continually interact and, through these exchanges, experience a spectrum of emotional states. Such emotions influence not only immediate reactions but also long-term attitudes and enduring patterns of behavior toward colleagues, subordinates, and superiors. The field of affective neuroscience concerned with the neural bases of emotion and the structural determinants of emotional regulation emerged in the early twenty-first century (Davidson et al. [23]; Phan et al. [24].; Vul et al. [25]). Hatfield, Waldman, and Reina underscored that emotions in the workplace constitute a pivotal construct for organizational behavior research, as they account for the attitudinal orientations and behavioral dispositions that shape collective performance [17].

3- Planning of the Review and Methodology

The overarching purpose of a systematic review (SR) is the identification, analysis, and interpretation of a phenomenon of relevance [26]. Research questions are therefore designed to interrogate the accumulated body of knowledge and to discern patterns, gaps, and implications [27]. An SR synthesizes the procedures involved in collecting, organizing, and critically evaluating the extant literature [28]. In the present investigation, the review is explicitly aligned with the stated research objectives, foregrounds lacunae in the current evidence base, and formulates recommendations to guide future inquiry [29, 30] . Following Palmatier et al. [31], the study identifies emergent thematic categories and organizes them into analytically coherent subcategories.

Systematic literature reviews have become a standard point of departure for establishing benchmarks in management practice [32]. The current review follows the structured procedure outlined by Watson [33], encompassing the phases of planning, implementation, and reporting (see Figure 1).

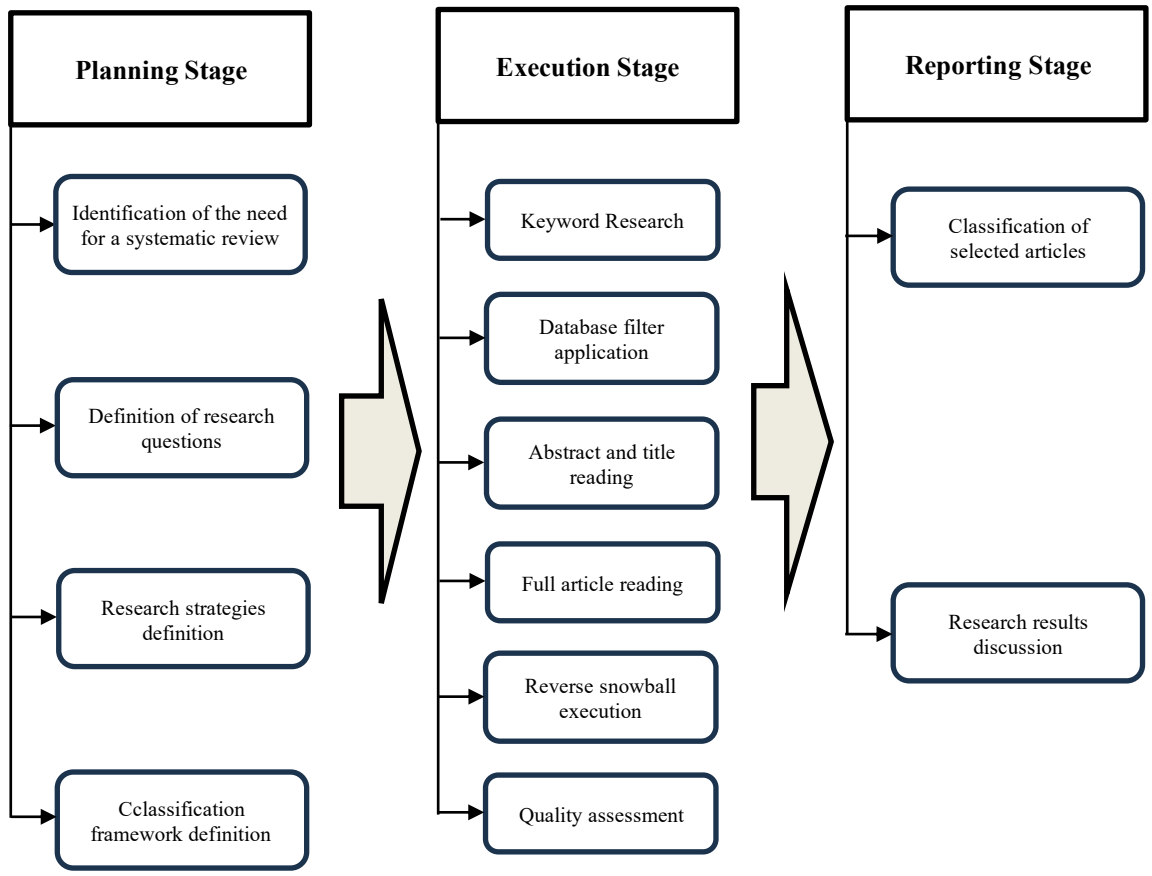

Figure 1. Systematic review stages

Watson [33] contend that the systematic review process constitutes an efficient technique precisely because it is anchored in a predetermined protocol and a well-defined search strategy. Given the ever-expanding corpus of publications in management and information systems (IS), which is continuously updated, systematic literature reviews (SLRs) have acquired increasing value. They enable scholars and practitioners alike to distinguish between evidence-based practice and literature grounded primarily in theoretical exposition [34]. The stages of the present SLR process are detailed below.

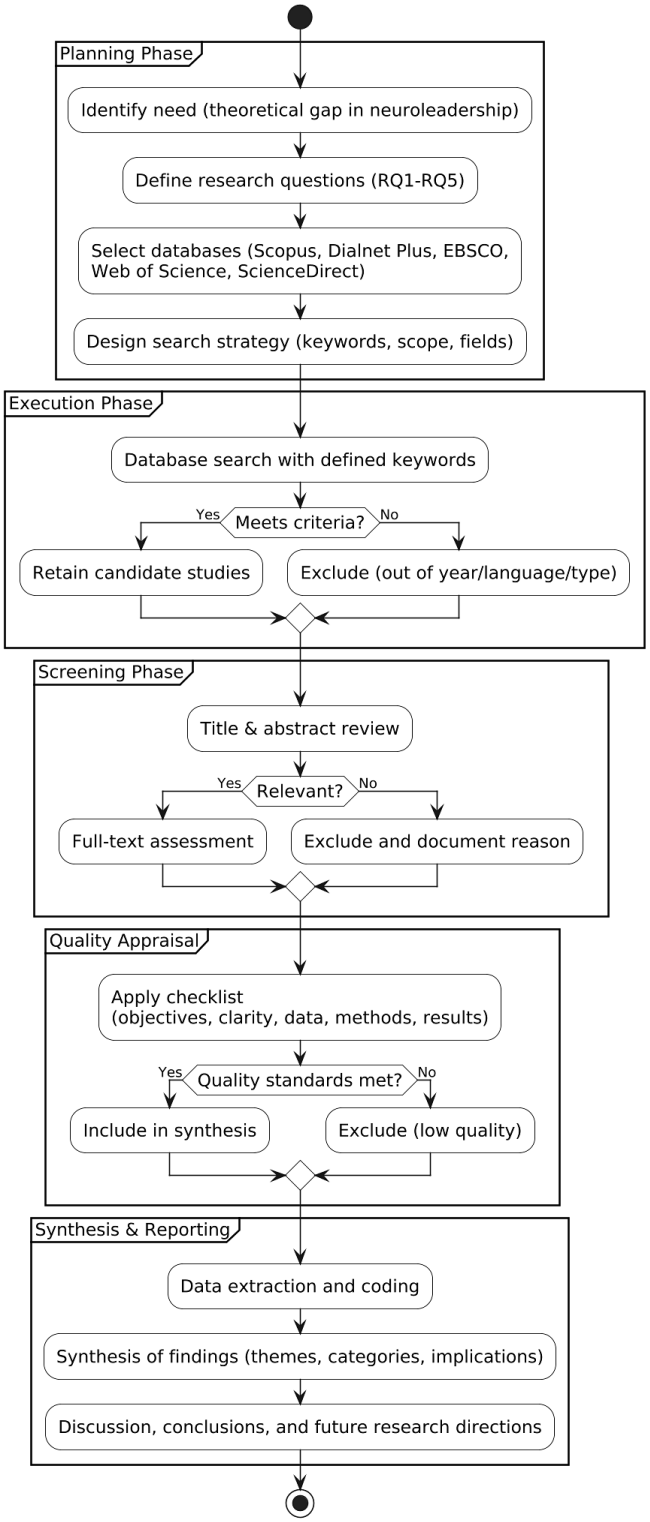

Figure 2. Methodological flow diagram

The methodological flow diagram (Figure 2) illustrates, in a structured manner, the phases that guided the systematic review. The process began with the identification of the need to conduct the study, arising from the problem and the theoretical gap surrounding neuroleadership. Next, the research questions were defined, which oriented the search for information in specialized databases such as Scopus, Dialnet Plus, EBSCO, Web of Science, and ScienceDirect. Once the sources were selected, the search was carried out using specific keywords, applying inclusion and exclusion criteria related to year of publication, language, and type of document. Records that did not meet these requirements were excluded at this stage. In the following phase, the titles and abstracts of the identified studies were reviewed, and only those that fulfilled the criteria proceeded to full-text analysis; the rest were excluded and documented. With the set of studies that passed this stage, a quality assessment was conducted to ensure scientific rigor and the relevance of the evidence. Articles meeting the established quality standards were retained, while those that did not were excluded.

Finally, the selected studies were subjected to synthesis and analysis of results, which gave rise to the discussion, conclusions, and proposals for future lines of research. This process, represented schematically in Figure 2, guarantees transparency, rigor, and systematicity in the review of the scientific literature.

3-1- Planning Stage

The planning stage involved defining the requirements of the systematic literature review (SLR) and was divided into four sub-stages. The first sub-stage justified the need for the review by exploring existing literature in the following scientific fields: neuroscience, brain processes, leadership, decision-making, human behavior, and emotional management in organizational contexts. After an exhaustive search, relevant research articles were integrated through systematic exploration of specialized databases, including Scopus, Elsevier, EBSCO, Dialnet Plus, and Web of Science. This stage also involved the selection of keywords, which included the terms neuroleadership and neuroscience, as well as related concepts such as decision-making, neuroplasticity, cognitive processes, problem solving, emotional management, human behavior and effectiveness, and engagement. The second sub-stage defined the research questions guiding the review [28]:

- Research Question 1: What is neuroleadership?
- Research Question 2: What are the objectives of neuroleadership in organizations?
- Research Question 3: How is neuroleadership related to cognitive processes?
- Research Question 4: What are the benefits of applying neuroleadership in organizations?
- Research Question 5: What are the challenges of neuroleadership in organizations?

The third sub-stage focused on developing search strategies through automated, systematic searches of online databases such as Scopus, Web of Science, EBSCO, Dialnet Plus, and ScienceDirect. Filtering techniques were applied to refine results from each database [35].

Finally, a systematic manual review was conducted. This included an initial screening of titles and abstracts, followed by a full-text review to eliminate irrelevant articles [36, 37]. Studies that did not align with the main research criteria were excluded. The criteria used for the selection of relevant articles are presented in Table 1.

Table 1. Selection Criteria

Criteria	Inclusion	Exclusion	Rationale
Type of publication	Academic articles	None: academic sources only	To ensure the retrieval of information from authorized and peer-reviewed academic sources.
Peer-reviewed	Peer-reviewed	None: only peer-reviewed	To guarantee the quality, reliability, and relevance of the articles used.
Publication year	Articles published between 2013 and 2025	Articles published before 2013	To ensure the validity of the articles included in this review, it is important to recognize that the challenges associated with neuroleadership have evolved over time. A 12-year period is appropriate for identifying and analyzing more solid and representative research trends.
Language	English and Spanish	Any language other than English and Spanish	To maximize international reach and maintain communication with scientific communities, achieving a balance between globalization and linguistic diversity in science.

3-2- Planning Stage

The techniques described in the planning phase served as the foundation for the execution stage, as outlined below: Identification of search keywords: The process of identifying keywords began by employing distinctive search terms extracted from existing articles within the research field [28, 38]. The keywords identified included TITLE-ABS-KEY ("Neuroliderazgo" OR "Neuroleadership" OR "Neuroscience of leadership" OR "Leadership neuroscience") TITLE-ABS-KEY ("Neuroliderazgo" OR "Neuroleadership" OR "Neuroscience of leadership" OR "Leadership neuroscience") AND PUBYEAR > 2014 AND PUBYEAR < 2026 , TITLE-ABS-KEY ("Neuroliderazgo" OR "Neuroleadership" OR "Neuroscience of leadership" OR "Leadership neuroscience") AND PUBYEAR > 2014 AND PUBYEAR < 2026 AND (LIMIT-TO (LANGUAGE , "English")), TITLE-ABS-KEY ("Neuroliderazgo" OR "Neuroleadership" OR "Neuroscience of leadership" OR "Leadership neuroscience") AND PUBYEAR > 2014 AND PUBYEAR < 2026 AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "cp")), Filtering techniques were used to enhance the accuracy of research findings during the exploration of online databases [26, 33].Different parameters were applied to cover the research fields, such as information systems and management, year of publication (2014–2026), document type (journal articles and conference papers), and language (English).

A meticulous review was conducted to evaluate the relevance of each article in relation to the objectives of the study, with particular attention to titles and abstracts [39]. Articles that passed this stage underwent full-text analysis to ensure their content aligned with the aims of the review [40]. To guarantee that all included studies met minimum quality

standards, specific evaluation criteria were applied [38]. A checklist was formulated on the basis of established guidelines [37, 41, 42]. covering the following items: whether the research objectives were clearly articulated; whether the research questions and problem statements were explicit; whether the data were adequately described and accessible; whether the methodology was properly presented and applied; and whether the results were reported clearly and addressed the stated research questions.

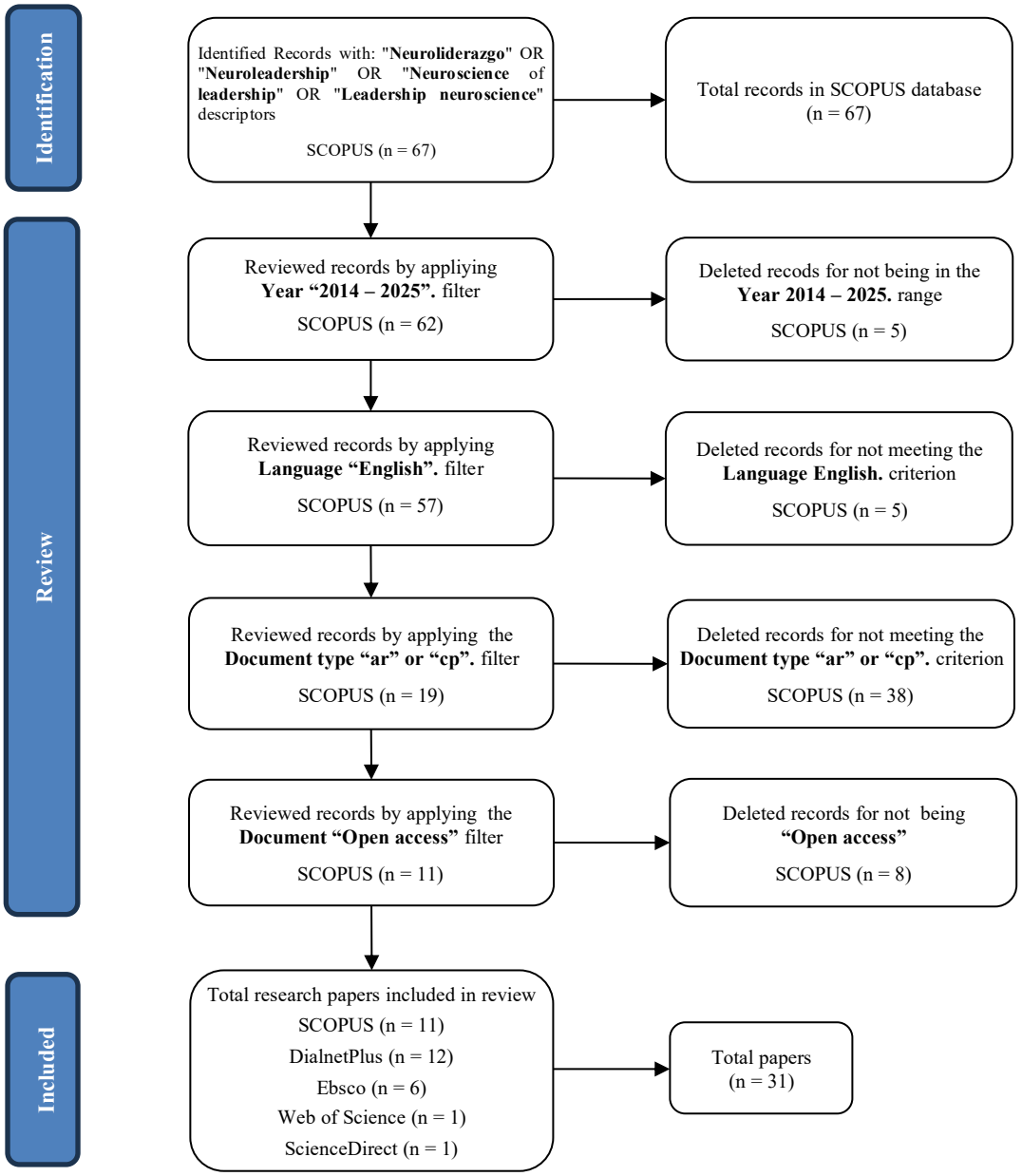

Figure 3. PRISMA diagram

A quality score was then assigned to determine whether each article satisfied the study's quality requirements. This score also allowed us to examine whether individual quality variables such as sample size or validation technique were associated with the primary outcomes of the research. In order to mitigate bias and strengthen reliability, all relevant studies were subjected to this assessment after the selection phase, resulting in the evaluation of 67 articles (Figure 3).

Based on these quality criteria, the selected studies were judged in terms of scientific rigor, reliability, precision, and pertinence. Only those providing specific, original, and valuable contributions were retained as evidence to inform future academic and professional work.

3-3- Summary and Reporting Stage

The total number of articles selected for this systematic review is presented in Figure 3. The initial database search identified 67 articles. After applying database filters, this number was reduced to 62. A subsequent manual review was then carried out to identify publications irrelevant to the study's scope, leading to the exclusion of 5 additional records

and leaving a total of 57 articles. During the detailed reading phase, the researchers applied specific criteria related to objectives, research questions, data description, methodology, and analytical techniques. This meticulous process resulted in the removal of 38 further articles, reducing the pool to 19. Eight additional records were excluded due to lack of access. To complement the dataset, 20 additional articles were incorporated from other databases, raising the final total to 31 articles. These were organized and coded in Microsoft Excel and are available for consultation at http://doi.org/10.6084/m9.figshare.29595329.

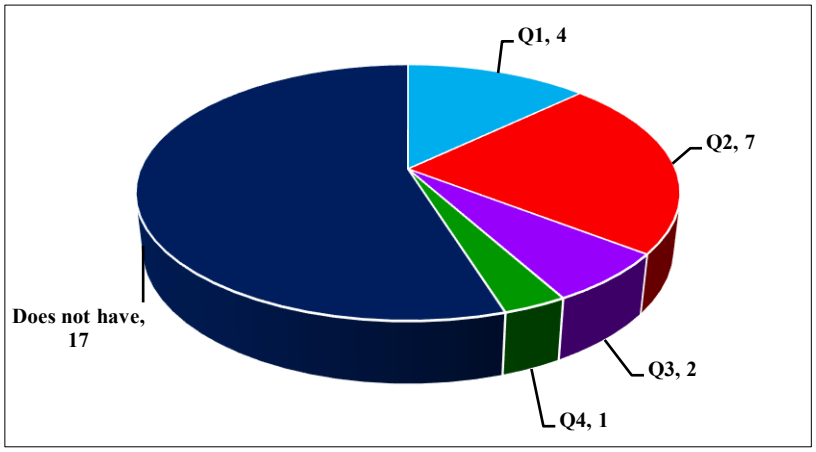

Figure 4. Quartile article distribution pie chart

Figure 4 illustrates the distribution of these articles across quartiles (Q1–Q4): four articles were published in Q1 journals, seven in Q2, two in Q3, and one in Q4. This distribution shows that research on neuroleadership is being published predominantly in high-impact, internationally recognized journals. Such a pattern suggests that findings in this field are not only relevant but also meet rigorous quality standards, thereby strengthening the validity of the results and providing a reliable basis for future theoretical and applied analyses. It should also be noted that 17 additional articles not indexed within quartiles were included, given their pertinence in addressing the research questions guiding this systematic literature review.

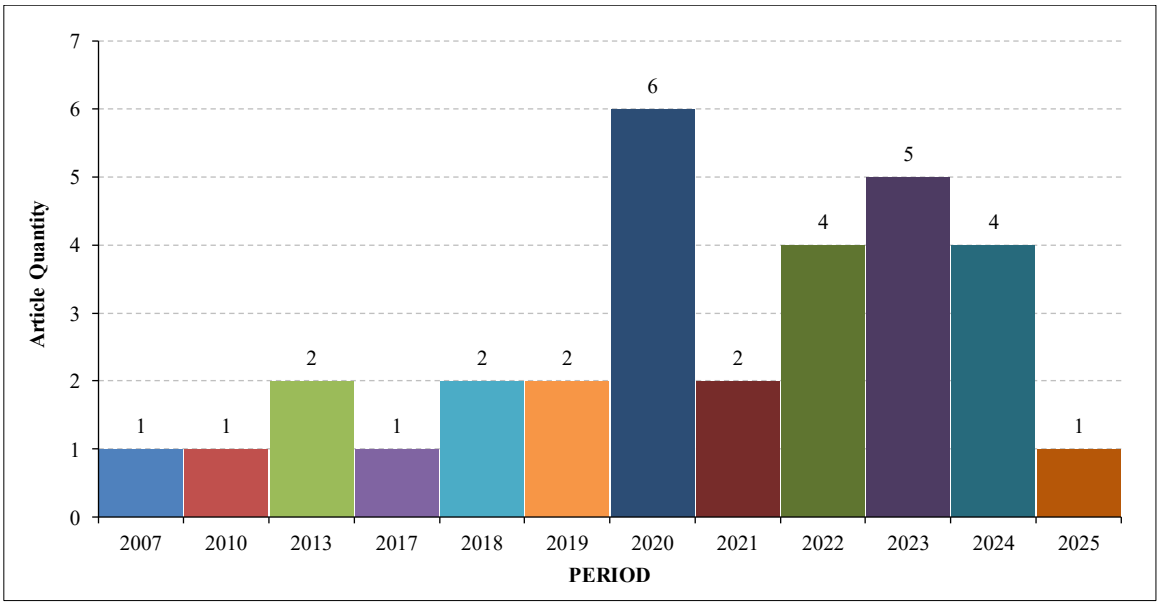

Figure 5. Number of published articles through 2007 to 2025 bar chart

Figure 5 illustrates the temporal evolution of scientific production on neuroleadership, revealing steady growth over the years and a marked increase during the last decade, particularly from 2020 onward. This upward trajectory reflects both academic and professional interest in the field, likely driven by the growing demand for leaders capable of understanding the interplay between cognitive processes, emotions, and decision-making. The sustained rise suggests that neuroleadership is consolidating itself as a strategic and multidisciplinary field, one that is increasingly relevant for organizational innovation and the development of leadership competencies grounded in neuroscientific evidence.

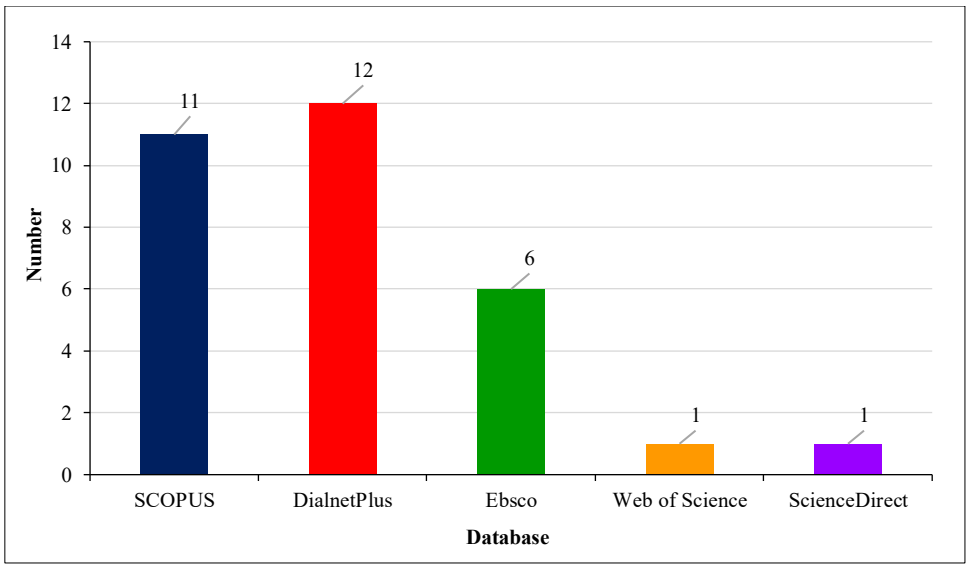

Figure 6. Article number per database bar chart

Figure 6 presents the distribution of articles by database of origin, highlighting that the majority were retrieved from internationally recognized and high-prestige repositories such as Scopus, Dialnet Plus, and EBSCO (29 articles). This concentration ensures that the evidence analyzed is of high quality and that the findings are supported by peer-reviewed and validated research. It also makes it possible to identify the most frequent and reliable sources for literature searches in the field of neuroleadership. The predominance of articles from established databases reinforces the credibility of the study and demonstrates that neuroleadership has achieved a consolidated level of scientific dissemination, enabling researchers and practitioners to access reliable information and effectively apply the findings in organizational contexts.

4- Research Results

The results of the study are presented below and classified in Table 2. Research Question 1 is reformulated here in order to explain the emerging themes.

Research Question 1: What is neuroleadership?

Neuroleadership is an emerging approach to leadership grounded in findings from cognitive and social neuroscience. Its purpose is to understand, improve, and optimize processes of management, decision-making, and human behavior within organizational contexts. The concept, originally developed by David Rock, applies knowledge of human brain functioning to leadership practices by integrating cognitive, emotional, and social dimensions [43]. In essence, neuroleadership seeks to define the neural basis of leadership and management by analyzing the brain processes that underlie individual conduct in areas such as motivation, decision-making, emotional intelligence, and interpersonal relationships [44]. Importantly, this perspective focuses not only on what leaders do but also on why they act as they do, recognizing the unconscious factors that profoundly shape their behavior [45].

One of neuroleadership's most significant contributions lies in explaining how the brain processes information under complex circumstances, such as organizational change, problem solving, or conflict management. As Rock and Schwartz argue, understanding the neural circuits associated with habit formation and resistance to change enables leaders to design more effective strategies for organizational transformation . Neuroleadership has also proven to be a valuable tool in leadership education and training, enhancing twenty-first century leadership skills such as emotional self-regulation, creativity, empathy, and decision-making under uncertainty [46]. Models such as Sylvia Damiano's i4 Neuroleader (2009) highlight four essential qualities for future-ready leaders: performance, collaboration, innovation, and agility.

Scholars such as Ringleb and Rock contend that neuroleadership is not merely a theoretical construct but an applied discipline that integrates neuroscience, change management, education, consulting, and coaching, thereby advancing the understanding of human behavior in organizations [43]. Social cognitive neuroscience, as emphasized by Ochsner and Lieberman, specifically investigates the interplay between mental, social, and neural processes in decision-making and interpersonal relationships foundational elements of effective leadership [43]. On a more technical level, neuroleadership employs brain observation tools to identify the mental effort involved in resolving contradictions, making ethical decisions, and constructing integrative solutions [47]. It also draws on research into mirror neuron systems, which underpin empathy, imitation, and emotional resonance with others [46] capacities essential for fostering cooperation and commitment within teams.

In the business sphere, neuroleadership has been recognized as an innovative strategy for enhancing productivity, performance, and innovation, equipping leaders with practical tools to better understand and manage human behavior [47]. It has likewise become central to addressing the challenges of digital transformation and change management in twenty-first-century organizations [47]. Finally, scholars such as Grah & Dimovski [48] and Palma-Avellán et al. [49] highlight neuroleadership as a form of leadership attuned to both present and future organizational needs, rooted in a deep understanding of the human being from biological, emotional, and cognitive perspectives. It is, therefore, not simply about leading with the mind, but about leading with knowledge of the brain and its potential an approach that enables the cultivation of leaders who are more conscious, empathetic, and effective.

In sum, neuroleadership is far more than a passing trend: it represents an interdisciplinary discipline that provides current and future leaders with scientifically validated tools to understand, influence, and transform people and organizations. Its distinctive value lies in bridging knowledge of the human brain with leadership practice, thereby fostering leadership development that is both evidence-based and human-centered.

Table 2. Main Components of Neuroleadership and Their Application

Neuroleadership Component	Description	Reference
Neuroscientific approach to leadership	Applies knowledge from social cognitive neuroscience to leadership in order to understand and improve management, decision-making, and human behavior in organizations.	Sułkowski & Chmielecki [43]
Neural basis of organizational behavior	Studies brain processes that explain motivation, decision-making, emotional intelligence, and interpersonal relationships in leadership.	Sułkowski & Chmielecki, Ramírez Contreras et al., and Gocen [43-45]
Unconscious factors in leadership	Considers how unconscious processes influence leaders' decisions and behaviors.	Gocen [45]
Change management and resistance	Understands neural circuits associated with habit formation and resistance to change to design more effective organizational transformation strategies.	Kuhlmann & Kadgien [46]
Training 21st-century leaders	Promotes skills such as emotional self-regulation, empathy, creativity, and decision-making in uncertain contexts.	Alvarado De Salas & Caruci Lozada [50]
i4 Neuroleader Model	Highlights key qualities of contemporary leadership: performance, collaboration, innovation, and agility.	Clark & Triegaardt [9]
Applied and interdisciplinary discipline	Integrates neuroscience, change management, education, and coaching to deepen understanding of leadership and organizational behavior.	Sułkowski & Chmielecki [43]
Decision-making and neuroscientific tools	Uses brain monitoring and studies on processes such as ethical decision-making and contradiction resolution to enhance leadership.	Kuhlmann & Kadgien and Palma-Avellán et al. [46, 49]
Mirror neurons and empathy	Considers the role of mirror neurons in empathy, imitation, and emotional connection essential for fostering collaboration in teams.	Kuhlmann & Kadgien [46]
Productivity and organizational transformation	Neuroleadership drives productivity and innovation, playing a key role in digital transformation and organizational change management.	Araque et al. and Palma-Avellán et al. [47, 49]
Conscious and empathetic leadership	Proposes leadership focused on a biological, emotional, and cognitive understanding of the human being, developing more conscious, empathetic, and effective leaders.	Gocen and Palma-Avellán et al. [45, 49]
Evidence-based holistic development	Presents neuroleadership as a discipline that connects brain science with leadership practice, promoting integral development rooted in evidence, empathy, and innovation.	Sułkowski & Chmielecki and de la Nuez et al. [43, 51]

Analyzing Table 2, it can be inferred that neuroleadership is not merely a collection of tools, but rather a systemic approach that links brain science with organizational practice. Neuroleadership draws on knowledge from social cognitive neuroscience to understand and optimize management, decision-making, and human behavior in organizational contexts. The ultimate aim of understanding brain functioning is to define the neural foundations of leadership by analyzing the processes that underpin motivation, decision-making, emotional intelligence, and interpersonal relationships all of which shape effective leadership and the ability to create more collaborative and adaptive environments.

By grounding itself in biological principles, neuroleadership provides a robust scientific basis for explaining human behavior, intervening effectively, and optimizing human interactions. Since many leadership behaviors are not purely rational or conscious, development strategies must include interventions that address both conscious and unconscious processes in uncertain contexts thus responding to the complex demands of the twenty-first century. In this sense, neuroscience offers evidence for structuring training programs that cultivate these competencies on biological and cognitive foundations. The i4 Neuroleader model, for example, reflects how modern leadership requires multiple capacities and a holistic approach supported by scientific evidence.

It is important to highlight that research on ethical decision-making adds rigor and precision to improving the quality of leadership decisions, particularly in resolving dilemmas and contradictions an essential capacity in complex organizational settings. Similarly, considering the role of mirror neurons in empathy and emotional connection demonstrates how neurobiology supports effective collaboration within teams, thereby providing a biological foundation for strategies that strengthen teamwork and inter-organizational relationships. Beyond its contributions to productivity and innovation, neuroleadership plays a critical role in digital transformation and organizational change processes, aligning neuroscience with contemporary technological and organizational trends.

Ultimately, neuroleadership advocates for more conscious and empathetic leadership grounded in a comprehensive biological, emotional, and cognitive understanding of the human being. It promotes development based on evidence, innovation, and empathy qualities essential for sustained organizational success in complex and dynamic environments of the twenty-first century.

Research Question 2: What are the objectives of neuroleadership in organizations?

According to Badenhorst, neuroleadership is an emerging discipline that applies insights from social cognitive neuroscience to leadership and organizational management. Its aim is to understand how brain processes influence human behavior and, from that foundation, to improve decision-making, problem solving, emotional self-regulation, and communication within organizations [45]. One of its primary objectives is to enhance employees' perception of the workplace. As Rock and Cox observed, employees experiencing dissatisfaction are unable to perceive positive changes in their leaders' behavior, hindering the development of a healthy organizational climate. To counter this, Khan argued that human resource policies grounded in neuroscientific knowledge are necessary, as they not only enhance individual well-being but also drive organizational outcomes [51].

David Rock, through the SCARF model, identified five key domains of social behavior that leaders must manage: status, certainty, autonomy, relatedness, and fairness. According to Rock and Cox, this model explains how threats or rewards in these domains directly influence brain functions associated with motivation and decision-making, thereby affecting workplace performance [45, 52]. Building on this, Burow contends that a central objective of neuroleadership is to create an organizational atmosphere that strengthens these dimensions, thereby fostering commitment and cooperation within teams [53].

Another important purpose is to facilitate organizational change and to cultivate emotionally intelligent leaders. Rock and Schwartz demonstrated that by understanding the neural circuits involved in habit formation and resistance to change, leaders can design more effective strategies for transformation [46]. Similarly, Leines-Jiménez and Maranto-Rivera emphasized the need to develop leaders who can self-regulate emotions, manage teams empathetically, and foster creativity and innovation under conditions of uncertainty [50]. Neuroleadership also supports organizational learning. The AGES model (Attention, Generation, Emotion, Spacing), developed by Rock and colleagues, provides a framework for designing training experiences aligned with neural processes. Schaufenbuel noted that such approaches improve knowledge retention and training effectiveness [54]. This is fundamental for the continuous development of human talent, particularly in the context of technological and digital transformation [55].

Conflict management constitutes another key objective. Becker, Cropanzano, and Sanfey demonstrated that tools such as the SCARF model can help explore the root causes of social tensions in the workplace, enabling leaders to address conflict from a neuroscientific and behaviorally grounded perspective [56]. Neuroleadership also seeks to support intelligent decision-making by optimizing the brain's cognitive resources. As Braidot argued, understanding how decisions are processed neurologically allows leaders to reduce bias, increase clarity, and enhance strategic effectiveness [47, 57] Schaufenbuel, Sułkowski, and Chmielecki further asserted that this perspective is applicable both to leadership development and to the design of organizational and educational policies aligned with sustainability and innovation [43, 58].

Finally, neuroleadership aims to promote the development of resilient organizations capable of adapting and thriving in the face of contemporary challenges. According to Atencio et al., understanding brain processes allows for the creation of more conscious organizational structures, better prepared to respond to crises, motivate personnel, and strengthen organizational culture [45, 49].

Summarizing, the objectives of neuroleadership in organizations include:

- Enhancing employees' perception and satisfaction [51].
- Developing emotionally intelligent and empathetic leadership skills [50, 54].
- Facilitating organizational change and transformation [46].
- Strengthening organizational learning based on neuroscientific principles [54, 55].
- Managing interpersonal conflicts using tools such as the SCARF model [56].
- Supporting strategic decision-making aligned with brain functioning [47, 57].
- Fostering resilient and sustainable organizational cultures [49].

The findings of this study indicate that these objectives extend beyond the strategic level: they imply a profound transformation of organizational culture, in which leaders learn to manage through an understanding of the cognitive and emotional processes of their teams. In this way, neuroleadership emerges as a means of humanizing management, directly addressing the question of its purposes within organizations. Ultimately, neuroleadership offers a renewed vision of contemporary leadership one that is brain-based, evidence-driven, and human-centered. Within this paradigm, every

leader must become a source of inspiration, generating trust and commitment among collaborators so that, collectively, they remain engaged with organizational goals. Achieving this requires mastery of emotional and social skills as essential complements to strategic and managerial competence.

Table 3. Key Objectives of Neuroleadership in Organizations

Neuroleadership Objective	Description	Reference
Improving employee perception and satisfaction	Aims for employees to perceive a healthy and motivating work environment, which enhances their well-being and performance.	de la Nuez et al. [51]
Developing emotionally and empathetically intelligent leadership skills	Trains leaders with emotional self-regulation, empathy, and team management capabilities in complex contexts.	Alvarado De Salas & Caruci Lozada [50]
Facilitating organizational change and transformation processes	Applies knowledge on resistance to change and neuroplasticity to design more effective change strategies.	Kuhlmann & Kadgien [46]
Enhancing organizational learning based on neuroscientific principles	Uses the AGES model to design brain-aligned training programs that improve knowledge retention.	Davachi et al. [54]
Managing interpersonal conflicts	Applies the SCARF model to understand and resolve social tensions in workplace environments.	Freedman [56]
Making strategic decisions aligned with brain function	Understands how decisions are processed in the brain to reduce bias and improve clarity and managerial effectiveness.	Araque et al. and Castillo [47, 57]
Fostering resilient and sustainable organizational cultures	Builds organizational structures prepared to face crises, motivate personnel, and adapt to changing environments.	Gocen and Palma-Avellán et al. [45, 49]
Creating organizational environments based on SCARF model domains	Manages status, certainty, autonomy, relatedness, and fairness to motivate personnel and improve teamwork.	Gocen, Rock & Christensen, and Elenkova [45, 52, 53]

Research Question 3: How is neuroleadership related to cognitive processes?

Neuroleadership is an interdisciplinary field that integrates findings from neuroscience with leadership practices to examine how brain processes shape human behavior and organizational management. According to Braidot, the central aim of neuroleadership is to delineate and clarify the relationship between the neural context of leadership and management, analyzing brain processes that underpin individual behavior, motivation, decision-making, and emotional intelligence factors that determine how leaders interact with others and learn within organizational settings [10].

From the perspective of cognitive neuroscience, authors such as Lezak, Howieson, and Loring emphasize the role of the frontal lobe particularly the prefrontal cortex as the seat of executive functions such as control, regulation, and behavioral planning. These functions enable individuals to engage successfully in independent and productive behaviors [44]. Braidot argues that executive functions are crucial for leaders to make intelligent decisions and to manage teams and organizations effectively. Equally significant is the interaction between the prefrontal cortex and the amygdala, a central structure of the limbic system. Guyton describes the amygdala as a “node” of neural communication that interprets an individual’s place in the world, while Braidot highlights how this interaction supports the emotional regulation characteristic of conscious and effective leadership [10, 44]. Such regulation is indispensable for stress management and for cultivating healthy work environments, as Damiano also observes [18].

Braidot further underscores the importance of examining neurochemical mechanisms underlying motivation, learning, and decision-making, including dopamine, serotonin, cortisol, and oxytocin. These substances exert direct influence on both leader and team behavior [51]. For instance, dopamine is associated with reward systems that motivate individuals to achieve goals, while oxytocin is linked to trust and cooperation within teams, as highlighted by Bachrach and others [18, 51, 59] Rock’s SCARF model provides an additional framework for understanding how the brain perceives social stimuli as threats or rewards, thereby influencing cognition and organizational behavior. The model identifies status, certainty, autonomy, relatedness, and fairness as critical dimensions for decision-making and emotional regulation within teams [7, 56]. Leaders who recognize these dynamics are better equipped to create work climates that foster cooperation and reduce stress.

The mirror neuron theory, explained by Rizzolatti and colleagues, also plays a pivotal role in understanding empathy and social imitation cognitive processes that enable leaders to resonate with the emotions and thoughts of their collaborators, thereby fostering communication and group cohesion [46]. This neurocognitive insight supports the development of social skills essential for effective leadership. In terms of learning and habit formation, authors such as Duhigg and Lieberman have described how the brain automatizes behaviors through repetition and reward systems, processes in which the basal ganglia play a central role [60, 61]. Braidot complements this view by noting that understanding these mechanisms allows leaders to facilitate adaptation and organizational change factors crucial for innovation and long-term success [18, 62].

In the educational sphere, Ruiz, Ruiz, and Gómez argue that neuroleadership is closely linked to a leader’s ability to induce positive changes in the academic and professional performance of collaborators by enhancing motivation, emotional intelligence, and decision-making [61]. Similarly, Braidot stresses that effective educational management requires leaders who are competent, capable of teamwork, and grounded in deep self-knowledge and regulation of

cognitive processes [11, 44]. Finally, Goleman and colleagues emphasize that the human brain possesses a unique capacity to understand and interpret the emotions and thoughts of others, thus enabling empathy and active listening. These capacities are fundamental for leaders to cultivate trust, optimism, and collaboration within their teams [53]. Such mutual understanding anchored in cognitive and emotional processes is essential for reducing conflict, motivating collaborators, and improving organizational performance.

In summary, neuroleadership is related to cognitive processes because it investigates how the brain's executive functions (planning, control, emotional regulation), together with specific neurochemical and neural systems (amygdala, mirror neurons, basal ganglia), shape decision-making, motivation, learning, and emotional intelligence in leaders and their collaborators. Integrating neuroscientific knowledge into leadership practice therefore facilitates the creation of organizational environments that are more efficient, healthier, and transformative, as highlighted by Braidot, Ruiz, Goleman, Rock, and other leading experts in the field [10, 11, 44, 51, 53, 56, 59].

Table 4. Relationship Between Neuroleadership and Cognitive Processes

Relationship Between Neuroleadership and Cognitive Processes	Description	Reference
Understanding brain circuits for learning and habit formation	Neuroleadership facilitates the design of strategies based on the understanding of brain circuits that regulate learning and habit formation.	Kuhlmann & Kadgien [46]
Using neuroplasticity for organizational change	Applies the principles of neuroplasticity to support the creation of new, lasting behaviors within organizations.	Atencio Bravo et al., and Rock [10, 60]
Developing attentional capacity	Strengthens attention and focus as foundations for improved managerial performance and organizational learning.	Atencio Bravo et al. [10]
Increasing cognition and creativity through reward states	Increasing cognition and creativity through reward states	Rock & Christensen [52]
Promoting emotional self-regulation and empathy	Supports emotional control, empathy, and emotional intelligence, facilitating higher-order cognitive processes.	Alvarado De Salas & Caruci Lozada [50]
Implementing brain-based coaching	Applies neuroscientific knowledge to improve coaching practices that directly impact cognitive development.	Kuhlmann & Kadgien [46]
Designing brain-focused change programs	Change programs are designed by considering deep emotional and cognitive moments to facilitate learning and transformation.	Davachi et al. [54]
Using conversational intelligence and emotional regulation	Integrates cognitive and emotional processes to support adaptation to technological and organizational change.	Palma-Avellán et al. [49]

Analyzing Table 4, it becomes evident that neuroleadership is fundamentally connected with cognitive processes through the efficient understanding and management of the mind and brain. Comprehending how neural circuits involved in learning and habit formation operate is essential for designing strategies that foster the acquisition of new behaviors. Aligning training programs with the neuronal mechanisms that regulate the consolidation of habits and effective learning enhances the capacity for adaptation and organizational transformation. Neuroplasticity, in turn, allows the brain to reconfigure itself through experience, a process indispensable for creating lasting behavioral changes. This capacity supports both the adoption of new skills and the overcoming of resistance to change, generating real and sustainable transformation at both the individual and collective levels.

Strengthening attention and concentration enables individuals to maintain consistent focus on strategic objectives, thereby improving decision-making, problem-solving, and overall performance all of which amplify leadership effectiveness. Similarly, generating reward states stimulates cognition, perception, and creativity, fostering a motivating work environment that drives innovation, encourages collaboration, and promotes the generation of novel solutions to organizational challenges. Within this framework, promoting emotional self-regulation and empathy becomes crucial for emotional intelligence in leadership. These capacities facilitate conflict management, increase team resilience, and foster a positive organizational climate improving productivity and adaptability to change. The application of brain-based coaching is also vital, as it supports profound and sustainable behavioral change, while enhancing self-awareness and motivation to achieve both personal and organizational goals. Ultimately, neuroleadership links effective leadership to specific brain mechanisms underlying cognitive processes, fostering conscious, adaptive leadership aligned with human biological nature an approach that strengthens organizational performance and team well-being.

Research Question 4: What are the benefits of applying neuroleadership in organizations?

The application of neuroleadership within organizations offers multiple benefits that positively impact organizational behavior, effective leadership, and the integral development of work teams. First, neuroleadership contributes to positive organizational behavior and long-term success. According to Ringleb and Rock, this discipline supports the design of policies and practices that generate positive affective experiences in the workplace, enhancing employees' psychological and emotional well-being. These outcomes translate into stronger alignment with organizational objectives and overall improved performance [51]. This underscores neuroleadership as a strategic investment that fosters employee engagement and motivation.

With regard to decision-making, Ringleb and Rock highlight that neuroleadership provides the emotional regulation and critical thinking capacities necessary to solve complex problems and manage organizational change [43]. Carrillo emphasized that intellectual and emotional factors are decisive in managerial decision-making, noting that leadership informed by brain science strengthens trust, creativity, and the ability to address organizational challenges [63]. Helwig adds that neuroleadership fosters a resilient organizational climate by promoting optimism, presence, and commitment within teams qualities essential for adaptability and sustainability [59]. Similarly, Dweck, Murphy, Chatman, and Kray identify that organizations adopting a growth mindset, driven by neuroleadership practices, report higher levels of trust and internal acceptance, which in turn facilitates innovation and continuous learning [59].

Another significant benefit lies in the development of cognitive and emotional skills. Ringleb and Rock stress that neuroleadership combines neuroscience and psychology to strengthen capacities such as emotional intelligence, empathy, creativity, and collaboration skills that are indispensable for effective teamwork and communication [50, 64]. Pittman highlights that applying neuroscientific knowledge to leadership enhances employee motivation and engagement through interventions rooted in mindfulness and emotional management [65]. This engagement fosters a stimulating work environment that promotes creativity, problem-solving, and sustainable positive outcomes [52].

In the field of education and organizational training, Ringleb and Rock argue that neuroleadership supports the design of more effective learning programs. Models such as AGES (Attention, Generation, Emotion, Spacing) increase learning effectiveness and foster long-lasting behavioral change [54]. This approach also strengthens emotional self-regulation and the development of core leadership competencies [50, 65].

Beyond its impact on human development, neuroleadership also contributes to sustainability and technological integration within organizations. Braidot and Brunatto emphasize that this discipline not only enhances the human factor but also promotes responsible use of technology and alignment with global sustainable development goals, such as those outlined in Agenda 2030 [55, 58, 63]. In doing so, organizations remain competitive while upholding their social responsibility.

In summary, authors such as Ringleb and Rock [43, 51], Helwig [59], Dweck et al. [59], Pittman [52, 65] , Vallejo et al. [63], and Braidot and Brunatto [55, 61], converge on the conclusion that the implementation of neuroleadership generates benefits across multiple dimensions: enhancing emotional well-being, increasing engagement, strengthening decision-making, fostering organizational resilience, developing cognitive and emotional skills, and promoting organizational sustainability. This evidence consolidates neuroleadership as an indispensable tool for advancing more effective and human-centered management in contemporary organizations.

Table 5. Benefits of Neuroleadership

Benefits of Neuroleadership	Description	Reference
improved emotional well-being and emotion management	Increases employees' psychological and emotional well-being, enhancing their engagement and job performance.	de la Nuez et al. [51]
Development of effective, flexible, and sustainable leadership	Development of effective, flexible, and sustainable leadership	Fingelkurts et al. [66]
Educational transformation and teacher training	Contributes to the training of educators and educational leaders with skills to face 21st-century challenges.	Davachi et al. [54]
Building resilient organizational cultures	Promotes healthy, ethical work environments aligned with organizational values.	Pittman [59]
Facilitates organizational change and habit modification	Supports lasting behavioral change in organizations through understanding brain processes.	Kuhlmann & Kadgien, and Rock [46, 60]
Promotes innovation and creativity	Stimulates creativity, perception, and collaboration through brain states linked to reward and motivation.	Rock & Christensen, and Davachi et al. [52, 54]
Strengthening emotional intelligence	Improves emotional self-regulation, empathy, and social skills for more effective leadership.	Alvarado De Salas & Caruci Lozada [50]
Support for human capital management with technology	Integrates neuroleadership with AI to optimize talent management and facilitate technological change.	Stăneiu et al. [55]
Improvement in leadership training and development	Helps identify and develop leaders with socially desirable brain-based traits.	Bishop & Creed [67]
Increase in productivity and organizational engagement	Enhances employee motivation, satisfaction, and effort toward achieving organizational goals.	Ramírez Contreras et al. [44]

Analyzing Table 5, it becomes evident that the benefits of neuroleadership extend well beyond operational efficiency. Its impact is both profound and multidimensional, improving key aspects that drive organizational success and employee psychological well-being. Neuroleadership cultivates in leaders essential capacities such as emotional intelligence and self-regulation, thereby fostering healthier work environments, strengthening commitment, and enhancing performance.

Because emotions directly influence motivation and productivity, these effects translate into more competitive and sustainable organizations. Neuroleadership also promotes the development of leaders capable of adapting with flexibility and resilience to organizational change, ensuring both continuity and long-term sustainability. Such leaders are better prepared to understand and manage their own mental processes as well as those of their teams, enabling more conscious and strategic decision-making.

The evidence suggests that neuroleadership fosters workplaces that are healthy, ethical, and consistent with organizational values, while promoting cohesion, respect, and collaboration in the face of complex challenges. By clarifying how brain processes underlie habit formation and behavioral change, neuroleadership facilitates organizational transformation, ensuring that change is deep and sustainable. Furthermore, it increasingly integrates with artificial intelligence tools to optimize talent management and enhance decision-making in human resources. In this sense, it contributes to the identification and development of leaders with neural profiles that favor social, cognitive, and emotional competencies skills that are indispensable for leadership in complex and dynamic environments.

Ultimately, neuroleadership not only promotes emotional well-being and effective emotion regulation, but also strengthens leadership, fosters resilient cultures, facilitates innovation, and improves productivity through a deepened understanding of the cognitive and emotional processes that shape organizational life.

Research Question 5: What are the challenges of neuroleadership in organizations?

Despite its multiple benefits, neuroleadership faces significant challenges in its implementation and development. These must be addressed to maximize its impact on organizational management, employee well-being, and workplace performance

1. Awareness and valuation of affective dimensions in the workplace

A key challenge lies in leaders recognizing the importance of cultivating positive affective experiences, which improve employees' psychological and emotional states. When treated as a strategic investment, these experiences strengthen alignment with organizational policies and employee commitment. Rock and Schwartz highlight that emotional management is essential for improving both job satisfaction and performance [51].

2. Changing individual and organizational habits

Transforming habits is inherently complex, as it requires reshaping deep neural circuits. Rock and Schwartz note that neuroleadership can provide effective strategies by clarifying the brain mechanisms involved in learning and habit formation, which is fundamental for achieving sustainable organizational change [46, 60].

3. Developing adaptive leaders for changing contexts

In both educational and organizational spheres, it is critical to prepare leaders who are flexible and adaptive, especially given the demands of the Fourth Industrial Revolution. Pérez and López stress that neuroleadership must equip leaders to contribute positively to society and respond effectively to complex environments [9].

4. Building resilient and ethical organizational cultures

Another challenge is fostering organizations that are resilient, trustworthy, and ethically grounded. García and Martínez emphasize that eliminating toxic leadership practices and retaining talent requires integrating neuroleadership to promote healthy, resilient, and sustainable climates [59].

5. Preventing and managing interpersonal conflict

Neuroleadership must facilitate systems that can anticipate and mitigate conflicts, thereby improving collaboration and the overall work environment. Fernández and Sánchez argue that the application of neuroscientific knowledge is essential for managing these dynamics effectively [56].

6. Reforming organizational management through neuroscience

Adopting a strategic change management approach based on real brain functioning remains a considerable challenge. Jiménez and Torres point out that supporting employees in developing sustainable new behaviors is essential for advancing meaningful organizational reforms [60].

7. Integrating technology and digital transformation

The incorporation of technologies such as artificial intelligence into talent management requires neuroleaders to act as change agents who balance human emotion with technological rationality. Rodríguez and Villanueva note that this integration is key to fostering cultures of continuous learning and adaptability [55].

8. Developing emotional and social competencies

Fostering emotional intelligence, empathy, and assertive communication among leaders is fundamental to meeting the demands of contemporary organizational leadership. Yet, Hernández and Cruz observe that many organizations continue to struggle to fully develop these capacities [18].

9. Promoting positive organizational culture and sense of belonging

Shaping organizational culture to value autonomy and leadership from a neuroleadership perspective represents another challenge, particularly for traditional management structures. Martínez and Gómez highlight the need to create work environments that are flexible, supportive, and effective, with neuroleadership as a pillar of educational and organizational transformation [11].

10. Training and dissemination of neuroleadership

Finally, a cross-cutting challenge is the systematic training and awareness of leaders, educators, and teams in neuroleadership principles. Ramírez and Silva argue that successful implementation depends on investment in educational programs that enable coherent and strategic application of these insights [6].

Table 6. Challenges of Neuroleadership in Organizations

Neuroleadership Challenge	Description	Reference
Awareness and appreciation of the affective dimension in the workplace	Importance of developing positive affective experiences to improve well-being and engagement.	Gocen [45]
Changing individual and organizational habits	Transforming deep-seated habits through neuroscientific strategies to achieve sustainable change.	Shea et al., and Hereira [40, 58]
Training adaptive leaders for changing contexts	Preparing flexible leaders capable of responding to the challenges of the Fourth Industrial Revolution.	Ramírez Contreras et al. [44]
Building resilient and ethical organizational cultures	Promoting healthy, ethical, and sustainable work climates to eradicate unhealthy leadership.	Freedman [56]
Preventing and managing interpersonal conflicts	Designing systems to predict and mitigate conflicts, improving collaboration.	Clark & Triegaardt [9]
Reforming organizational management through neuroscience	Supporting the creation of new behaviors based on how the brain actually functions.	Hereira [58]
Integrating technology and digital transformation	Combining emotion and technology (AI) to foster continuous learning and organizational adaptation.	Palma-Avellán et al. [49]
Developing emotional and social competencies	Promoting emotional intelligence, empathy, and assertive communication in leaders.	Stăneiu et al. [55]
Promoting a positive organizational culture and sense of belonging	Creating kind, flexible, and effective work environments that integrate neuroleadership for transformation.	Elenkova [53]
Training and dissemination of neuroleadership	Training educators and leaders to apply neuroleadership strategically and coherently.	Rock & Schwartz [62]

Analyzing Table 6, it can be argued that overcoming the challenges of neuroleadership requires transforming organizations and their management in an integral manner. Developing positive affective experiences strengthens psychological well-being and employee commitment. Neuroleadership enhances emotional intelligence by creating environments in which emotions are recognized and managed appropriately, thereby fostering motivation, trust, and job satisfaction. The application of neuroscientific strategies, in turn, enables the transformation of deep-seated habits in both individuals and groups, producing sustainable changes in organizational behavior and driving a culture of continuous improvement grounded in knowledge of brain functioning. At the same time, it prepares flexible and resilient leaders who can respond effectively to the challenges of the Fourth Industrial Revolution, integrating cognitive, emotional, and digital skills for successful management in complex and dynamic environments.

Consequently, neuroleadership promotes healthy work climates that eliminate toxic leadership practices and generate cohesive, responsible teams committed to sustainable objectives. It is particularly important to emphasize that strategies informed by neuroscience facilitate conflict mitigation, improve communication and collaboration, and foster harmonious, productive workplaces. In this sense, neuroleadership drives the creation of new organizational behaviors based on a genuine understanding of brain processes, enabling more conscious, adaptive management aligned with natural human capacities. By fostering emotional intelligence, empathy, and assertive communication in leaders, it strengthens team cohesion, problem solving, and motivation ultimately promoting positive organizational cultures rooted in belonging. Therefore, it is essential to prepare educators and leaders capable of applying neuroleadership strategically and coherently, ensuring that neuroscientific principles are translated into effective and sustainable organizational practices.

In conclusion, neuroleadership provides a comprehensive framework for developing leaders and organizational cultures that are healthy, resilient, and innovative. Such leaders are equipped to address contemporary challenges through a deep understanding of the brain, emotions, and technology, translating this knowledge into well-being, commitment, and high productivity in the workplace.

5- Discussion

The findings emphasize the crucial role of neuroleadership in strengthening organizational resilience. It promotes optimism, engagement, adaptability, innovation, continuous learning, and authenticity qualities that enable leaders to face uncertainty with strength and clarity. Neuroleadership also reinforces executive functions such as planning, control, and behavioral regulation, which are essential for sound decision-making, maintaining productive and adaptive organizational structures, and guiding teams toward innovation in highly complex contexts [59]. In educational and training settings, neuroleadership emphasizes self-knowledge and cognitive regulation to support teamwork and to enhance academic and professional performance. Collectively, the evidence suggests that neuroleadership offers multiple benefits for organizational behavior, effective leadership, and team development. It supports the design of policies and practices that generate positive affective experiences in the workplace, thereby improving managerial effectiveness, psychological well-being, and team development, while increasing alignment with organizational goals, employee commitment, and performance. Moreover, neuroleadership knowledge facilitates the design of training programs that optimize learning, promote lasting behavioral change, and develop key competencies for adaptive and transformative leadership competencies that must also align with responsible technology use and sustainable development [48, 49, 60]. Importantly, leaders must recognize and value the affective dimension of the workplace; without this awareness, it is difficult to generate the positive experiences that drive engagement and job satisfaction.

Our review also underscores the necessity of modifying entrenched individual and organizational habits in order to transform behavioral patterns. Strategies grounded in neuroscientific knowledge, such as those proposed by neuroleadership, provide pathways for sustainable change [49, 60]. For instance, understanding brain mechanisms related to reward, habit formation, and neuroplasticity enables the design of interventions that not only initiate change but also sustain it over time. Yet, such change requires the sustained commitment of the entire organization. It must be supported by policies, resources, and a culture that values innovation, continuous learning, and adaptability [51]. Without such commitment, interventions risk becoming isolated or superficial efforts incapable of generating meaningful and durable impact.

Developing adaptive and flexible leaders also emerges as a critical element in contexts of high uncertainty, such as those posed by the Fourth Industrial Revolution [9]. Leaders must cultivate deep understanding of personal and organizational principles, alongside technical, emotional, and social competencies that allow them to navigate complexity, manage change, and build resilience within their teams. This requires not only technical proficiency but also emotional and social intelligence, as well as a growth mindset that enables adaptation to novel scenarios.

When compared to prior studies, the distinctiveness of this work becomes clear. Boyatzis et al. (2013) [68] emphasized the development of leaders' emotional competencies but do not systematically integrate cognitive processes. Rock (2008) [69] centers his analysis on the neuroscientific foundations of leadership, without examining in depth the specific benefits and challenges across diverse organizational contexts. Goleman (2013) [70] highlighted emotional leadership as a tool for performance enhancement, but adopts a primarily conceptual rather than methodological stance. In contrast, the present study extends and complements these contributions by offering a framework that integrates theory, empirical evidence, and practical applications. This integrative perspective not only deepens the understanding of neuroleadership but also provides concrete tools for its effective implementation in contemporary organizations.

As an emerging field, neuroleadership rests upon multiple theoretical frameworks that illuminate both its contributions and its challenges in the twenty-first century. One of the most significant is Deci and Ryan's Self-Determination Theory (SDT) [17], which posits that individuals must satisfy three basic psychological needs autonomy, competence, and relatedness to achieve optimal functioning. This theory explains why neuroleadership, by integrating cognitive and emotional processes, fosters leaders who enhance intrinsic motivation and cooperation within teams. Consistent with this, Gagné & Deci [71] noted that the satisfaction of these needs increases commitment, well-being, and productivity in organizational settings.

Rock's SCARF model (2008) [69] provides another highly relevant framework by identifying five social domains status, certainty, autonomy, relatedness, and fairness that directly impact neural responses. These domains clarify how leaders can manage emotions, reduce resistance to change, and foster more collaborative and resilient work environments. Rock and Cox [72] emphasize that perceived threats in these domains activate defensive brain responses, whereas positive experiences stimulate reward circuits that increase trust and commitment [73].

Similarly, Bass's theory of transformational leadership [74] intersects with neuroleadership by underscoring the importance of inspiration, motivation, and human potential development. While transformational leadership is grounded in organizational psychology, neuroleadership enriches it by providing neuroscientific evidence that processes such as neuroplasticity, emotional regulation, and empathy strengthen leaders' transformational capacities. Waldman et al. [75] further reinforce this connection by demonstrating that neural activity is associated with transformational leadership

behaviors, thereby lending empirical validity to this perspective.Goleman's concept of emotional intelligence [70, 76] also gains stronger theoretical grounding through neuroscience. He identifies self-awareness, self-regulation, and empathy as essential competencies for effective leadership. Neuroscientific studies confirm that structures such as the amygdala and the prefrontal cortex play active roles in emotional regulation and decision-making, aligning closely with the findings of this review. Integrating emotional intelligence with neuroleadership therefore not only affirms the central role of emotions in management but also explains their biological underpinnings

Finally, the field of organizational neuroscience, advanced by Becker et al. [77], advocates for analyzing workplace behavior from a neurological perspective. This approach reinforces the idea that neuroleadership is not merely a conceptual framework but an applied discipline that connects biology with strategic management. As Boyatzis et al. [14] pointed out, such integration enables the design of evidence-based leadership programs that promote durable learning and sustainable behavioral change. Taken together, these theoretical perspectives consolidate neuroleadership as a comprehensive paradigm that combines neuroscience, psychology, and management. Its relevance lies in offering a more complete explanation of how leaders can foster well-being, resilience, and innovation in complex and rapidly changing environments characteristic of the twenty-first century.

6- Conclusions

This systematic review demonstrates that neuroleadership is consolidating in the twenty-first century as an innovative approach that integrates advances in neuroscience with organizational management practices. It promotes a more human, empathetic, and effective style of leadership capable of responding with agility to contemporary challenges. Moreover, it fosters the development of holistic leaders prepared to lead with awareness, adaptability, and strategic vision in organizations undergoing constant transformation.

The fundamental aim of neuroleadership is to advance resilient, adaptive, and sustainable organizations capable of navigating increasingly digital, complex, and volatile environments. By strengthening key competencies in leaders, this perspective enables more human-centered, efficient, and health-oriented management. Furthermore, by aligning its strategies with the principles of the 2030 Agenda, neuroleadership positions itself as a pivotal tool for building organizations attuned to sustainability goals and collective well-being.

Neuroleadership is closely linked to cognitive processes executive functions, emotional regulation, and specific neural and neurochemical mechanisms that directly shape decision-making, motivation, learning, and emotional intelligence. By integrating neuroscientific knowledge with leadership practice, neuroleadership promotes a more conscious and biologically grounded approach, fostering organizational environments that are healthier, more adaptive, and more transformative.

The application of neuroleadership yields multiple benefits, including enhanced emotional well-being, increased employee commitment, improved decision-making, strengthened organizational resilience, and the development of both cognitive and emotional skills. These contributions impact not only individual and collective performance but also support the creation of workplace cultures that are human-centered, adaptive, and oriented toward sustainable growth. In today's world, characterized by complexity and volatility, neuroleadership emerges as a strategic instrument for organizational development from a neurocognitive perspective.

Nevertheless, its effective implementation entails important challenges. Chief among them is the need to train and sensitize leaders, educators, students, and teams to its core principles. For neuroleadership to translate into practice, it must be embedded in educational and strategic programs that support teaching, learning, and leadership development. This process faces significant obstacles, including resistance to change, insufficient institutional readiness, and the absence of an organizational culture open to adaptability. Overcoming these barriers requires a long-term strategic vision that ensures neuroleadership's impact on twenty-first century organizations is both consolidated and sustainable..

6-1- Directions for Future Research

This review also highlights several gaps and opportunities that should guide future research, helping to advance a more rigorous and contextualized understanding of neuroleadership in organizational and educational domains.

First, there is a lack of empirical studies validating the effectiveness of neuroleadership through quantitative and qualitative evidence in real-world contexts. Most of the literature remains theoretical or exploratory. Future research should prioritize controlled interventions to measure its impact on variables such as productivity, organizational climate, decision-making, and emotional well-being.

Second, more in-depth analyses are needed regarding sector-specific applications for instance, in higher education, public administration, technology firms, and healthcare organizations. These contexts demand adaptive and conscious leadership and would allow examination of how neuroleadership principles adapt across diverse organizational and cultural settings.

Third, the relationship between neuroleadership and digital competencies remains largely unexplored. In the era of digital transformation and artificial intelligence, research is needed on how neuroleaders can balance human and technological dimensions in decision-making and talent management, particularly in virtual and hybrid environments.

Fourth, there is a pressing need to evaluate educational and training programs designed to cultivate neuroleadership competencies. Studies should examine the effectiveness of different pedagogical models in strengthening cognitive, socio-emotional, and strategic skills in future leaders.

Fifth, further research is required on the link between neuroleadership and core executive brain functions such as attention, working memory, cognitive flexibility, and emotional self-regulation. This line of inquiry should employ neuroscientific methodologies such as EEG, fMRI, or longitudinal designs to strengthen the scientific foundation of the field.

Finally, the most urgent challenge lies in bridging the gap between neuroscientific evidence and its practical application, while also overcoming institutional resistance to change. Without training programs for educators, leaders, and students, and without organizational commitment to embedding these practices, widespread implementation of neuroleadership will remain limited even when its benefits are strongly supported by existing literature.

On the basis of these findings, we recommend the design of training programs that integrate emotional self-awareness, stress management, effective communication, and decision-making grounded in neuroscientific principles. Complementary strategies may include neurocognitive coaching, mentorship programs, collaborative learning spaces, and scenario-based simulations aimed at fostering resilience and adaptive leadership. Such interventions are applicable across universities, corporations, and public-sector organizations, underlining the cross-contextual relevance of neuroleadership.

To consolidate the evidence base, future research should prioritize rigorous empirical validation through longitudinal and field-based designs that track the development and transfer of neuroleadership competencies over time. Additionally, the integration of artificial intelligence tools to monitor cognitive load and decision-making biases may further enhance neuroleadership by offering real-time feedback to optimize emotional regulation and managerial effectiveness.

Finally, research should explore the role of neuroleadership in cultivating resilient and sustainable organizational cultures aligned with the United Nations' Sustainable Development Goals. The nexus between leadership, sustainability, organizational well-being, and social responsibility remains underexplored from a neuroscientific perspective.

- Empirical validation of neuroleadership's impact on key organizational variables.
- Sector- and culture-specific applications of neuroleadership.
- Integration of neuroleadership with digital transformation and artificial intelligence.
- Evaluation of educational programs for neuroleadership competency development.
- Investigation of links between executive brain functions and leadership skills.
- Exploration of neuroleadership as a pathway to resilient, ethical, and sustainable organizations.

Together, these directions can consolidate neuroleadership as a robust, applied, and contextually grounded scientific discipline with tangible impact on organizational transformation in the twenty-first century.

7- Declarations

7-1- Author Contributions

Conceptualization, Y.T.R.B. and S.E.C.M.; methodology, Y.T.R.B. and S.E.C.M.; software, Y.T.R.B.; validation, Y.T.R.B., S.E.C.M., and J.A.H.L.; formal analysis, Y.T.R.B.; investigation, Y.T.R.B.; resources, S.E.C.M.; data curation, Y.T.R.B.; writing—original draft preparation, Y.T.R.B.; writing—review and editing, S.E.C.M. and J.A.H.L.; visualization, Y.T.R.B.; supervision, S.E.C.M.; project administration, S.E.C.M.; funding acquisition, S.E.C.M. All authors have read and agreed to the published version of the manuscript.

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Not applicable.

7-6- Conflicts of Interest

The authors declare that there is no conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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