


Original article

## Leadership and organizational climate for innovation in an Ecuadorian mining company



### Liderazgo y clima organizacional de innovación en una empresa minera ecuatoriana

### Liderança e clima organizacional de inovação em uma empresa de mineração equatoriana

Jorge Oswaldo Proaño Vargas<sup>1</sup>  0009-0003-5922-0040  [jorgeproav@hotmail.com](mailto:jorgeproav@hotmail.com)

Angie Fernández Lorenzo<sup>1</sup>  0000-0001-6106-8576  [angie821218@gmail.com](mailto:angie821218@gmail.com)

<sup>1</sup> University of the Armed Forces - ESPE. Ecuador.

**Received:** 26/11/2023

**Accepted:** 13/12/2023

#### ABSTRACT

Leadership is fundamental in Ecuadorian companies, driving the development, efficiency and competitiveness of their employees. In Ecuador's mining companies, leadership is crucial to creating an innovative environment; leaders not only guide, but also inspire teams to achieve ambitious goals. They encourage creativity, the adoption of sustainable technologies and solutions, and promote a culture of innovation that benefits the mining industry and business progress in Ecuador. This paper was developed to evaluate how leadership influences the organizational climate for innovation in a mining company in Ecuador. Statistical models of factor analysis were applied to establish which type of leadership has the greatest influence on the organizational climate for innovation in the company studied. Relationships were found between transformational and transactional leadership factors with flexibility and innovation support, while task orientation in the field of innovation is influenced by elements of passive leadership.

**Keywords:** leadership; leadership styles; organizational climate; innovation; organizational climate of innovation; mining.

## RESUMEN

El liderazgo es fundamental en las empresas ecuatorianas, impulsando el desarrollo, la eficiencia y la competitividad de sus colaboradores. En las empresas mineras de Ecuador, el liderazgo es crucial para crear un entorno innovador, los líderes no solo guían, sino también inspiran a los equipos para lograr metas ambiciosas. Fomentan la creatividad, la adopción de tecnologías y soluciones sostenibles y promueven una cultura de innovación que beneficia la industria minera y el progreso empresarial en Ecuador. El presente trabajo ha sido desarrollado para evaluar cómo el liderazgo influye en el clima organizacional de innovación en una empresa minera de Ecuador. Se aplicaron modelos estadísticos de análisis factorial para establecer qué tipo de liderazgo tiene mayor influencia en el clima organizacional de innovación en la empresa estudiada. Se evidenciaron relaciones entre factores del liderazgo transformacional y transaccional con la flexibilidad y ayuda a la innovación, mientras que la orientación a la tarea en el ámbito de la innovación está influenciada por elementos del liderazgo pasivo.

**Palabras clave:** liderazgo; estilos de liderazgo; clima organizacional; innovación; clima organizacional de innovación; minería.

---

## RESUMO

A liderança é fundamental nas empresas equatorianas, impulsionando o desenvolvimento, a eficiência e a competitividade de seus funcionários. Nas empresas de mineração equatorianas, a liderança é crucial para criar um ambiente inovador; os líderes não apenas orientam, mas também inspiram as equipes a atingir metas ambiciosas. Eles incentivam a criatividade, a adoção de tecnologias e soluções sustentáveis e promovem uma cultura de inovação que beneficia o setor de mineração e o progresso dos negócios no Equador. Este documento foi desenvolvido para avaliar como a liderança influencia o clima organizacional para a inovação em uma empresa de mineração no Equador. Foram aplicados modelos estatísticos de análise fatorial para estabelecer qual tipo de liderança tem maior influência sobre o clima organizacional de inovação na empresa estudada. Foram encontradas relações entre os fatores de liderança transformacional e transaccional com a flexibilidade e o apoio à inovação, enquanto a orientação para a tarefa no campo da inovação é influenciada por elementos de liderança passiva.

**Palavras-chave:** liderança; estilos de liderança; clima organizacional; inovação; clima organizacional de inovação; mineração.

---

## INTRODUCTION

The mining industry plays a strategic role in Ecuador's economy, and its success depends to a large extent on the motivation and ingenuity of employees, for which the work climate is fundamental. An innovative organizational climate in the workplace is a work environment that encourages and supports the development of novel ideas, teamwork and the adoption of innovative approaches to mining processes. For mining companies, a climate that fosters innovation brings a number of benefits, such as improved operational efficiency, cost savings, resource optimization and increased employee engagement.

The influence of leadership styles on the organizational climate for innovation in mining companies is a topic of great relevance today. Leadership styles play a key role in creating an environment conducive to innovation in an industry that often faces technological, environmental and operational challenges.

In mining companies, where safety, efficiency and sustainability are priorities, leadership can significantly influence the organizational climate for innovation. The transformational leadership style promotes that work teams adopt an innovation mentality, represented by a bold, creative and motivating vision, in the search for innovative solutions to the diverse problems that arise in the organizational work.

In this sense, one of the main priorities for mining companies, in terms of leadership development, should be to focus on effective management and communication with their employees. This implies encouraging the development of multiple skills, promoting open communication and stimulating the presentation of innovative contributions. In this way, the aim is to boost creativity and strengthen the ability to adapt in a sector that demands innovative solutions to overcome its challenges (Alcázar Cruz, 2020). Leadership has been a subject of study and reflection since ancient times. Plato, one of the first thinkers, addressed the issue of leadership and considered that a true leader must possess qualities such as wisdom, justice and courage. According to his perspective, an effective leader should not actively seek leadership, but should be recognized and voluntarily sought after by others. In

addition, he emphasized the importance of leaders being well trained in philosophy and ethics to make decisions for the benefit of the community.

Today, leadership in organizations is an area of great relevance in both academia and business. Studies have shown that effective leaders play a key role in the performance and productivity of companies. The skill to communicate effectively has been identified as one of the most relevant characteristics of leaders in organizations. This skill is crucial to establish a solid relationship with team members, generate trust and motivation, as well as transmit the vision and objectives of the company (Pedraja Rejas et al., 2019).

Leadership in organizations also involves the ability to create a clear and shared vision with team members and foster an environment of collaboration and support (Galarza Torres et al., 2022). Leadership effectiveness can be measured in terms of results and performance, both at the individual and organizational levels (Galarza Torres et al., 2019).

In this context, leaders must have a wide range of skills and competencies to meet the challenges of leadership in today's business environment. In addition to effective communication skills and the ability to inspire the team, sound decision making and the ability to adapt to different situations are also required. Diversity plays a crucial role in leadership in organizations, as leaders must be able to manage teams with members of different cultures, genders, ages and educational backgrounds (Yukl, 2008).

In the competitive world of the mining industry, leadership plays a crucial role in the success and sustainability of operations. Mining companies, with their unique challenges and rigorous demands, require exceptional leaders who can navigate difficult terrain and lead teams to achieve ambitious goals.

Leadership theories provide a conceptual framework that facilitates the understanding of how leaders impact their teams and organizations. They are not mutually exclusive; rather, they tend to combine into comprehensive approaches to leadership. These approaches are tailored to the specific situation and objectives, recognizing the flexibility needed to address the complexities and changing dynamics within an organizational environment.

Leadership styles are a fundamental component in understanding how leaders interact with their followers and exert influence.

Leadership styles represent the different ways in which leaders relate to their followers and make decisions (Northouse, 2018). Styles such as autocratic leadership, in which decisions are made unilaterally, and others such as democratic, in which followers are given participation, are evident. The fundamental thing in relation to styles is that they are not static or permanent, but adapt to different situations and conjunctures, with the aim of obtaining the best results in the organization. By employing different leadership styles to lead teams in the fulfillment of organizational objectives, they generate a significant impact on the organizational climate and group dynamics (Guerrero Bejarano et al., 2018).

One of the most recognized theories today is that of charisma, which identifies three leadership styles: transformational, transactional and Laissez-Faire (Bass & Avolio, 1994).

Transformational leadership focuses on inspiring and motivating followers to achieve high standards of performance and, in turn, personal development, based on the charisma and characteristics of the leader.

This style has proven to be particularly effective in fostering an organizational climate conducive to innovation. Transformational leaders inspire, motivate and stimulate employee creativity, leading to greater development of innovative ideas in the mining sector (Rodríguez Álvarez et al., 2018). Studies conducted in different contexts, such as tuna companies in Ecuador and civil construction companies, have shown that a favorable organizational climate directly influences labor performance and productivity. Improving the organizational climate for innovation can have a positive impact on the company's results, thus fostering growth and sustainable development in the mining sector (Northouse, 2018).

Transactional leadership focuses on rewarding for level of performance and applying sanctions for nonperformance, based on clear agreements with followers (Bass & Avolio, 1994).

It is essential to consider the different leadership styles that are applied in mining companies. Each leadership style has its own advantages and challenges and its choice can have a significant impact on the organizational climate for innovation and the performance of the mining company.

In conclusion, leadership in mining companies is a complex challenge that requires a deep understanding of leadership theories and styles. Leaders in this industry must be adaptable, able to lead in changing conditions and prioritize safety, sustainability and innovation. By combining effective

leadership theories with styles appropriate to the situation, mining companies can thrive in a competitive and challenging environment.

Organizational climate represents employees' shared perception of the work environment. It is an abstraction based on patterns of experiences and behaviors that influence employee performance and company results. Organizational climate can be understood from different perspectives and has become a crucial issue for human resource management in companies.

In mining companies, a positive organizational climate goes beyond employee well-being, encompassing effective communication, value-aligned decisions and prioritizing safety. This impacts productivity and talent retention. In a safety-focused industry, an environment that promotes compliance and open communication about risks is crucial for employee trust and engagement (Cangahuala Sedano & Salas Zeballos, 2022).

On the other hand, the organizational climate for innovation is a combination of conditions and characteristics that promote and support the development, application and diffusion of novel ideas. This type of climate is fundamental for growth and competitiveness in a dynamic business environment. In an innovative organizational climate, creativity, teamwork, experimentation and risk-taking are encouraged (Sánchez Campos & Siles Ortega, 2023).

In an innovative organizational climate, leaders play a key role. They must encourage creativity, be role models, support innovation initiatives and allocate adequate resources. They must also create open spaces and communication channels for the exchange of ideas and collaboration between employees from different hierarchical levels and areas. In addition, tolerance for error and continuous learning are essential aspects in an organizational climate of innovation (Araya Pizarro, 2019).

In summary, a healthy organizational climate and a climate of innovation are two essential components in the success of mining companies. Safety, effective communication and trust are fundamental to the organizational climate, while creativity and openness to change are essential to foster innovation in an industry that constantly faces technical and environmental challenges. The combination of these elements can make the difference between leadership in the mining industry and stagnation.

In this context, the objective of the research is to evaluate how leadership influences the organizational climate for innovation in a mining company in Ecuador.

## MATERIALS AND METHODS

The present research was developed with a mixed approach, a non-experimental design and correlational scope. The study population is composed of 124 employees and workers of a mining company located in the province of Imbabura, Ecuador, which is in the exploration phase and has foreign capital. The company has offices in the cities of Quito and Ibarra, which implies a decentralized organizational structure.

A census was taken of the entire population in order to apply a survey questionnaire to meet the proposed objective.

The questionnaire was developed based on the following instruments used in numerous international research studies:

- The Multifactor Leadership Questionnaire (MLQ), developed by Bass and Avolio (1997) to assess the leadership styles present in the company, consists of 36 items measuring nine different aspects of leadership, including transformational, transactional and Laissez-Faire leadership.
- The Organizational Climate Questionnaire developed by Patterson et al. (2005), from which the flexibility and innovation scale was used to evaluate the organizational climate for innovation in the company. This scale contains six items that evaluate aspects such as organizational communication, employee participation, organizational structure and support for innovation.
- Team Climate Inventory (TCI-14) proposed by Anderson and West (1998), which is composed of 14 questions that explore various aspects of team climate, including communication, decision-making, leadership, group cohesion, level of support among members, areas for improvement in the innovation climate, and how team leaders and team members are fostering or limiting creativity and innovation in their work environment.

The rating scale used was: 1 (Never); 2 (Rarely); 3 (Sometimes); 4 (Often) and 5 (Almost always). The interpretation of the results was structured in such a way that a higher score on each scale indicates a higher perceived presence of the corresponding leadership style and organizational climate.

Once the questionnaire was structured, it was validated by seven national and international experts in the topics under study, as shown in the following table.

**Table 1.** Experts participating in the validation of the questionnaire

Expert	Institution	Country	Academic level	Occupation	Years of experience
1	University of the Armed Forces - ESPE	Ecuador	PhD	Research professor	25
2	Independent Consultant	Ecuador	Master's Degree	Consultant	20
3	Prado & Navas	Ecuador	PhD	Mining Lawyer	22
4	University of Pinar del Río "Hermanos Saíz Montes de Oca".	Cuba	PhD	Teacher	18
5	El Ordeño	Ecuador	Master's Degree	Head of Human Resources	10
6	University of the Armed Forces - ESPE	Ecuador	PhD	Research professor	13
7	Lunding Gold	Ecuador	PhD	Human Resources Manager	19

Source: Own elaboration

Cronbach's Alpha was calculated based on the survey applied to the experts, determining a value of 0.88, an adequate value to validate the internal consistency of the instrument. However, adjustments were made to the instrument based on the experts' criteria.

The application of the questionnaire to the 124 employees of the mining company was carried out through Google Forms and the results were analyzed by applying descriptive statistics for the general analysis of the data. Additionally, a correlation analysis was performed with Spearman's Rho test and a factor analysis was applied. Microsoft Excel and IBM SPSS Statistics 22 were used for data processing.



## RESULTS AND DISCUSSION

The application of the instrument allowed to perform the statistical analysis shown below, especially the factor analysis that allowed to generate constructs of the most important relationships between the leadership factors and the organizational climate of innovation.

Table 2 shows the descriptive statistics of the different items of the applied questionnaire (MLQ-5X) on leadership and organizational climate for innovation.

**Table 2.** Descriptive statistics of the leadership and organizational climate of innovation items

<b>TRANSFORMATIONAL LEADERSHIP</b>	<b>Mean</b>	<b>Median</b>	<b>Sd</b>
<b>Idealized behavioral influence</b>			
Q6. He lets me continue to do my job as I have always done it, if he does not find it necessary to introduce a change.	4,06	4	1,03
Q14. He avoids showing concern for the results.	3,31	3,5	1,20
Q23. He develops ways to motivate us.	3,82	4	1,20
P34. He develops ways to motivate us.	3,77	4	1,07
<b>Idealized influence attributed</b>			
Q10. He puts me in a position to think about old problems in a new way.	3,73	4	1,06
Q18. He gives me a chance to know how I am doing.	3,95	4	0,96
Q21. He avoids making decisions.	2,73	3	1,30
Q25. He treats me individually.	3,73	4	1,30
<b>Inspirational motivation</b>			
Q9. He presents things with an approach that stimulates me.	3,99	4	1,12
Q13. He doesn't make me change what I do as long as things are going well.	4,10	4	0,99
Q26. He gives me what I want in exchange for my support.	2,96	3	1,34
Q36. He has my respect.	4,50	5	0,87
<b>Intellectual stimulation</b>			
Q2. He sets high goals.	4,13	4	0,98

Q8. I am proud to work with him.	4,14	4	1,04
Q30. He uses images and symbols to guide my efforts.	3,40	3	1,21
Q32. He finds out what I want and helps me get it.	3,77	4	1,22
<b>Individualized consideration</b>			
P15. He sets high goals.	4,02	4	1,07
Q19. He makes sure that there is a strong agreement between what he expects me to do and what I can get from him for my effort.	4,02	4	0,96
Q27. He demonstrates a strong belief in the saying "if it ain't broke, don't fix it".	3,00	3	1,28
Q29. For me it is a symbol of success and efficiency.	3,95	4	1,17
<b>TRANSACTIONAL LEADERSHIP</b>			
<b>Contingent reward</b>			
Q1. I feel good working with him.	4,21	4	0,98
Q11. He tries I see problems as opportunities to learn.	4,10	4	0,99
Q16. He expresses our important objectives in a simple way.	3,95	4	1,04
Q35. If I do not address him, he does not address me either.	2,62	2	1,45
<b>Management by active exception</b>			
P4. He pays personal attention to those who appear to be marginalized.	3,91	4	1,19
Q22. He has a special gift for knowing what I should consider important.	3,83	4	1,07
Q24. He gives me reasons to change the way I approach problems.	3,81	4	1,06
P31. He encourages the use of intelligence to overcome obstacles.	3,97	4	1,14
<b>PASSIVE LEADERSHIP</b>			
<b>Management by passive exception</b>			
Q3. His ideas have made me rethink some of my own ideas that I had never questioned before.	3,73	4	1,05
Q12. He knows how to recognize my achievements.	4,09	4	1,08
Q17. He provides me with new ways of approaching problems that were puzzling to me before.	3,86	4	0,98

Q20. He is satisfied with my work as long as the established standards are met.	4,23	4	0,91
<b>Laissez-Faire</b>			
Q5. Whenever I deem it necessary, I can negotiate with him the reward for my work.	3,70	4	1,20
Q7. He avoids telling me how to do things.	3,48	4	1,21
Q28. He voids getting involved in my work.	3,13	3	1,22
Q33. When I work well, he praises me.	3,94	4	1,20
<b>ORGANIZATIONAL ENVIRONMENT</b>			
<b>Innovation and flexibility</b>			
Q37. New ideas are readily accepted here.	3,98	4	1,04
Q38. This company responds quickly when changes are needed.	3,68	4	1,12
Q39. Management here is quick to identify the need to do things differently.	3,62	4	1,09
Q40. This organization is very flexible; it can quickly change procedures to meet new conditions and solve problems as they arise.	3,56	4	1,11
Q41. Assistance in developing new ideas is readily available.	3,61	4	1,12
Q42. People in this organization are always looking for new ways to address problems.	3,78	4	1,05
<b>Vision</b>			
Q43. To what extent do you agree with the objectives?	4,02	4	0,91
Q44. To what extent do you consider that your teammates are clear about the team's objectives?	3,74	4	0,91
Q45. To what extent do you think you can truly achieve your team's objectives?	3,94	4	0,86
Q46. To what extent do you think the objectives are beneficial to the organization?	4,13	4	0,91
<b>Safety in participation</b>			
Q47. We have an attitude of solidarity: "we are in this together".	4,06	4	1,07
Q48. Team members keep each other informed about work-related issues.	3,98	4	0,92

Q49. People feel understood and accepted by others.	3,85	4	1,04
Q50. In the team there is a real attempt to share information.	3,92	4	1,09
<b>Task oriented</b>			
Q51. Are team members prepared to question the rationale for what the team is doing?	3,85	4	1,01
P52. Does the team critically assesses potential and weaknesses in what it is doing to achieve the best possible results?	3,85	4	0,96
P53. Do the team members build on each other's ideas to achieve the best possible results?	3,85	4	0,99
<b>Innovation support</b>			
Q54. Team members are always looking for new ways of looking at problems.	3,73	4	1,11
Q55. In the team we take the necessary time to develop new ideas.	3,72	4	1,08
Q56. Team members cooperate to help develop and implement new ideas.	3,90	4	1,00

Source: Own elaboration based on statistical calculations

In the transformational leadership indicator, the item with the highest mean value of 4.50 is "He counts on my respect", from the inspirational motivation factor, followed by the mean value of 4.14 for "I feel proud to work with him", located in the intellectual stimulation factor. The item with the lowest mean value 2.73 is "He gives me what I want in exchange for my support", belonging to the factor idealized attributed influence.

As for the transactional leadership style, the item with the highest mean value is 4.21 corresponding to "I feel good working with him", followed by the mean value 4.10 for "Try to make him see problems as opportunities to learn", both items of the contingent reward factor. Likewise, the item with the lowest mean value of 2.62 is "If I don't talk to him, he won't talk to me" of the contingent reward factor.

With respect to the passive leadership style, the item with the highest mean value 4.23 is "He is satisfied with my work as long as the established rules are followed", followed by the 4.09 record of "He knows how to recognize my achievements", both items located in the passive leadership by

exception factor. In addition, the item with the lowest average value 3.13 is "Avoids getting involved in my work" of the Laissez-Faire factor.

As can be seen, in relation to the organizational climate for innovation, the item with the highest mean value 4.13 is "To what extent do you believe that the objectives are beneficial for the organization"; vision factor, followed by the value 4.06 of the item "We have a supportive attitude: "at this time we are together" of the factor security in participation. At the same time, the item with the lowest average value 3.56 is "This organization is very flexible; it can quickly change procedures to face new conditions and solve problems as they arise", of the innovation and flexibility factor.

Table 3 shows the result of the calculation of correlations through Spearman's Rho test, between the 14 integrated factors of leadership and organizational climate of innovation, presenting only the dimensions that show significant correlations of moderate or high order.

**Table 3.** Correlations between the factors of leadership and organizational climate for innovation

Organizational climate dimension of innovation	Leadership dimension	Level of significance	Description
Innovation and flexibility	Idealized behavioral influence	0,419**	Significant, moderate positive correlations
	Inspirational motivation	0,428**	
	Intellectual stimulation	0,487**	
	Individualized consideration	0,506**	
	Contingent reward	0,430**	
	Management by active exception	0,476**	
Task oriented	Direction by passive exception	0,608**	Significant, high positive correlations
	Laissez-Faire	0,704**	
Innovation support	Intellectual stimulation	0,602**	Significant, high positive correlations
	Contingent reward	0,714**	

Source: Own elaboration based on statistical calculations

Note: \*\*.  $p < 0.01$  (bilateral)

The factors of the organizational climate of innovation that presented significant positive correlations of the highest order with the leadership factors studied were: innovation and flexibility, task orientation and innovation support.

In the case of innovation and flexibility, they showed significant correlations with four factors associated with transformational leadership (idealized behavioral influence, inspirational motivation, intellectual stimulation and individualized consideration), as well as with two factors associated with transactional leadership (contingent reward and passive leadership by exception). While task orientation presented high positive significant correlations with passive leadership factors and innovation support with the intellectual stimulation factor (transformational leadership) and contingent reward (transactional leadership).

### Factor analysis between leadership factors and organizational climate for innovation

Spearman's Rho coefficient was calculated for the 56 variables of the questionnaire, from which 34 were extracted, all with moderate and high correlations and with statistical significance that allowed the analysis to continue. The calculated determinant was found to be a positive value different from zero, indicating strong relationships between the variables.

The Kaiser-Meyer-Olkin coefficient (KMO) presented a value of 0.949, favorable in terms of the feasibility of the components and Bartlett's sphericity with a p-value < 0.01, therefore, the null hypothesis (Ho) was rejected and, consequently, the elements are related to each other and the factor analysis is adequate.

Table 4 shows the variance calculated for the 34 variables or components.

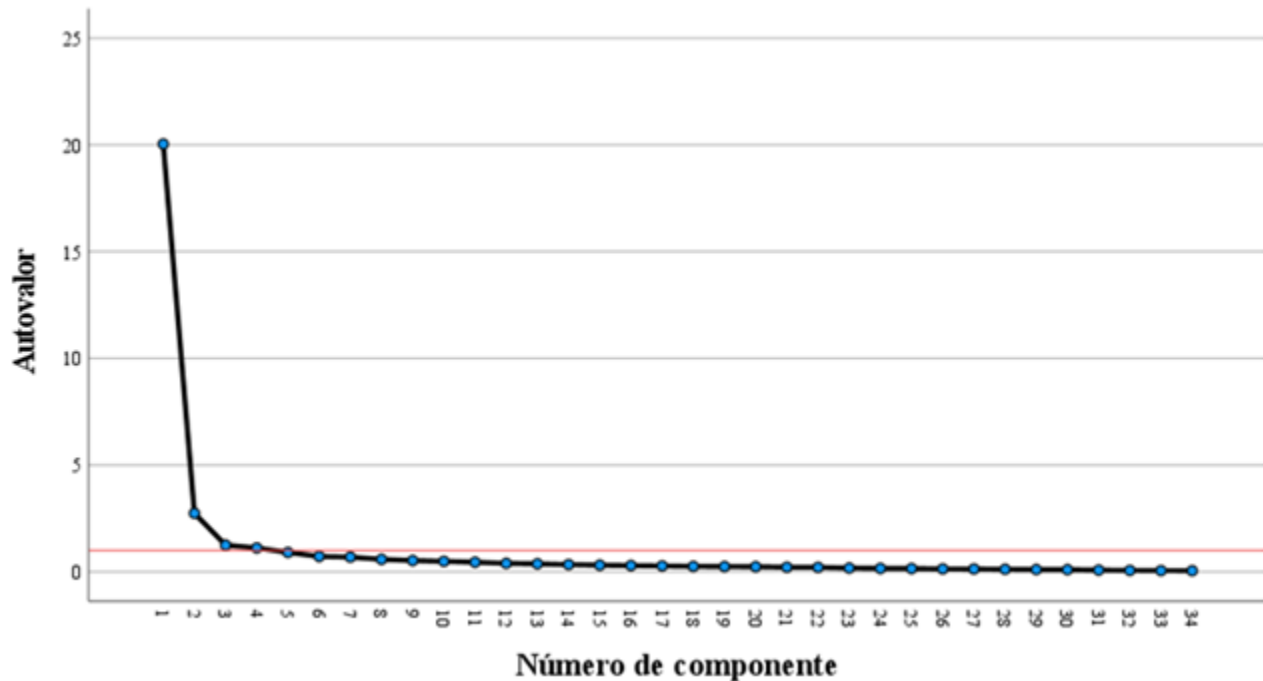
**Table 4.** Total variance explained by variables

Component	Total	Variance (%)	Accumulated (%)
<b>1</b>	<b>20,046</b>	<b>58,959</b>	<b>58,959</b>
<b>2</b>	<b>2,741</b>	<b>8,063</b>	<b>67,022</b>
<b>3</b>	<b>1,250</b>	<b>3,676</b>	<b>70,698</b>
4	1,117	3,286	73,984
5	0,909	2,672	76,656
6	0,718	2,112	78,768

7	0,688	2,023	80,791
8	0,584	1,718	82,508
9	0,528	1,553	84,061
10	0,490	1,442	85,503
11	0,449	1,321	86,825
12	0,396	1,164	87,988
13	0,374	1,100	89,089
14	0,339	0,996	90,085
15	0,310	0,911	90,996
16	0,292	0,858	91,854
17	0,275	0,809	92,663
18	0,254	0,747	93,410
19	0,245	0,720	94,130
20	0,238	0,699	94,829
21	0,214	0,630	95,459
22	0,207	0,610	96,069
23	0,176	0,518	96,587
24	0,160	0,471	97,058
25	0,154	0,452	97,510
26	0,137	0,402	97,911
27	0,132	0,389	98,300
28	0,119	0,351	98,651
29	0,107	0,314	98,966
30	0,101	0,296	99,261
31	0,079	0,234	99,495
32	0,065	0,192	99,687
33	0,056	0,164	99,851
34	0,051	0,149	100,000

Source: Own elaboration based on statistical calculations

As can be seen, the first three components account for approximately 71% of the accumulated variance, which is confirmed by the sedimentation graph (Figure 1).



**Figure 1.** Sedimentation graph and suggested relationship components

Source: Statistical calculations

The previous figure also shows that from the third component onwards, the eigenvalue is less than 1 and the variance contribution tends to stabilize at a constant value. Consequently, the first three components show the strongest correlations between leadership and organizational climate for innovation, an adequate number of constructs to generate. It should be noted that component 1 accounts for more than half of the variability.

Component 1 would be made up of all the factors that make up the organizational climate dimension of innovation: support for innovation, task orientation, security of participation, vision, innovation and flexibility. Likewise, component 2 would be made up of the factors: leadership by passive exception, leadership by active exception, contingent reward, intellectual stimulation and idealized behavioral influence. Finally, component 3 is made up of the factors: idealized attributed influence, individualized consideration, inspirational motivation and Laissez-Faire.



**Table 5.** Component analysis matrix

	Components		
	1	2	3
Q9. He presents things with an approach that stimulates me.	<b>0,845</b>	0,263	-0,104
Q12. He knows how to recognize my achievements.	<b>0,840</b>	0,338	-0,100
Q11. He tries I see problems as opportunities to learn.	<b>0,839</b>	0,265	-0,102
P15. He sets high goals.	<b>0,836</b>	0,349	-0,105
Q19. He makes sure that there is a strong agreement between what he expects me to do and what I can get from him for my effort.	<b>0,836</b>	0,297	0,288
Q17. He provides me with new ways of approaching problems that were puzzling to me before.	<b>0,826</b>	0,298	0,321
Q29. For me he is a symbol of success and efficiency.	<b>0,818</b>	0,343	0,290
Q8. I am proud to work with him.	<b>0,817</b>	0,272	-0,101
Q32. Finds out what I want and helps me get it.	<b>0,816</b>	0,331	0,159
P31. He encourages the use of intelligence to overcome obstacles.	<b>0,807</b>	0,308	0,102
Q22. He has a special gift for knowing what I should consider important.	<b>0,805</b>	0,285	0,288
Q23. He develops ways to motivate us.	<b>0,769</b>	0,407	0,288
Q16. He expresses our important objectives in a simple way.	<b>0,750</b>	0,414	0,277
Q18. He gives me a chance to know how I am doing.	<b>0,738</b>	0,398	0,312
Q24. He gives me reasons to change the way I approach problems.	<b>0,715</b>	0,428	-0,111
Q37. New ideas are readily accepted here.	<b>0,692</b>	0,456	-0,102
Q33. When I work well, he praises me.	<b>0,676</b>	0,363	0,288
Q30. He uses images and symbols to guide my efforts.	<b>0,609</b>	0,341	0,413
Q39. Management here is quick to identify the need to do things differently.	<b>0,590</b>	0,505	0,194
Q35. If I do not address him, he does not address me either.	0,227	<b>0,833</b>	0,208
P4. He pays attention to those who seem to be marginalized.	0,329	<b>0,825</b>	0,265
Q1. I feel good working with you.	0,316	<b>0,820</b>	0,232

Q13. He doesn't make me change what I do as long as things are going well.	0,302	<b>0,812</b>	0,205
P52. Does the team value the potential and weaknesses in what it is doing to achieve the best possible results?	0,401	<b>0,801</b>	0,218
Q49. People feel understood and accepted by others.	0,365	<b>0,787</b>	0,282
Q51. Are team members prepared to question the rationale for what the team is doing?	0,357	<b>0,778</b>	0,286
Q44. To what extent do you consider that your teammates are clear about the team's objectives?	0,328	<b>0,722</b>	0,134
Q54. Team members are always looking for new ways of looking at problems.	0,234	<b>0,709</b>	0,288
Q45. To what extent do you think you can truly achieve your team's objectives?	0,402	<b>0,646</b>	0,288
Q43. To what extent do you agree with the objectives?	0,468	<b>0,608</b>	0,116
Q40. The people on the team are always looking for new ways of looking at problems.	0,456	<b>0,562</b>	0,200
Q38. This company responds quickly when changes are needed.	0,452	<b>0,548</b>	0,327
Q54. If I do not address him, he does not address me either.	-0,178	0,301	<b>0,848</b>
Q7. He avoids telling me how to do things.	0,108	0,232	<b>0,578</b>

Source: Own elaboration based on statistical calculations

The constructs were elaborated on the basis of the questions and are obtained in positive correlation values ( $p < 0.01$ ) ranging from 0.41 to 0.84, as shown in the correlation matrix. From the 14 dimensions that evaluate the leadership actors and the organizational climate of innovation in a mining company in Ecuador, the constructs shown in the table have been established:

**Table 6.** Elaboration of constructs

Component	Construct	Items	Total items
1	Leader-climate dynamics	P9, P12, P11, P15, P19, P17, P29, P8, P32, P31, P22, P23, P16, P18, P24, P37, P33, P30, P39	19
2	Secure participation for innovation	P35, P4, P1, P13, P52, P49, P51, P44, P54, P45, P43, P40, P38	13
3	Innovative passive influence	P54, P7	2

Source: Own elaboration based on statistical calculations

### Construct analysis

The **Leader-Climate Dynamics** construct, made up of the factors inherent to this dimension, has an incidence in the total variability of 55.88 %. This construct can be considered as a positive force that can help the mining company to be more innovative by providing employees with resources and opportunities to develop new ideas, as well as a supportive and collaborative environment.

This construct is intrinsically linked to transformational leadership, aimed at fostering a positive climate for innovation in the company, providing employees with the necessary resources and opportunities to cultivate new ideas, while fostering a supportive and collaborative environment. Under a transformational leadership approach, it emphasizes the importance of inspiring and motivating members of the organization to actively contribute to the innovation process, promoting a culture of change and continuous improvement.

The **Safe Participation for Innovation** construct was formed with several factors from the transactional and transformational leadership domain with others from innovation and flexibility, vision and safety in participation, indicating that, in the case of the company studied, elements such as contingent rewards and leadership by active exception influence an environment conducive to innovation.

The **Passive Innovative Influence** construct was integrated by a factor of passive leadership with innovation support, specifically the capabilities of team members to evaluate problems. In this sense, it is shown that this is the type of leadership that has the least influence on the organizational climate for innovation in the mining company.

Some general ideas can be inferred based on the research results. In the mining company studied, leadership emerges as a critical factor affecting the organizational climate for innovation, considering that the diversity of existing leadership styles can have a significant impact on the internal dynamics of the company.

Leadership management in a mining company highlights the critical importance of assessing and adapting leadership styles to drive innovation, as argued by renowned leadership scholars such as Bass and Avolio (1994). This approach becomes particularly relevant in the context of transformational leadership, where the ability to inspire, motivate and foster creativity becomes a determining factor, according to the theories of Burns (1978), a pioneer in the identification of this style.

From the hiring phase to the shaping of the organizational climate, every aspect must align with the vision of transformational leadership. This type of leadership should thrive in a dynamic business environment. In the context of innovation, authors such as Yukl (2008) suggest that a transformational leader can significantly influence the mindset and attitudes of employees, promoting an organizational climate conducive to the generation of new ideas and the implementation of innovative solutions.

The ability to adapt leadership to the drive for innovation, supported by studies such as those of Bass and Riggio (2006), thus becomes a key factor in the sustained success of a mining company in a constantly changing environment. Taken together, these perspectives support the idea that transformational leadership is essential for fostering an organizational climate of innovation in the mining industry.

On the other hand, promoting transactional leadership involves more than simply setting clear guidelines and making sound decisions, it also requires adopting practices that foster innovation, as argued by renowned leadership scholars such as Bass and Avolio (1994). In the context of a mining company, this perspective translates into the optimization of key processes, such as talent recruitment and retention. Under a leadership focused on results, in line with the theories of authors

such as Locke and Latham (2002), effectiveness is measured not only by the achievement of goals, but also by the ability to identify and attract individuals with skills and competencies that are crucial for the sustainable development of the company.

At the same time, this type of leadership, supported by studies such as those of Román Bermeo et al. (2023), is committed to creating a work environment that not only tolerates, but also fosters creativity and experimentation. These characteristics are revealed as essential to address changing challenges and foster innovation in the mining industry, as suggested by the research of authors such as Salgado Escobar et al. (2022). Taken together, these practices supported by various studies contribute to effective leadership that drives innovation in the mining sector.

A thorough review of human resource policies emerges as an essential component in this process, in line with the perspective of leading leadership scholars such as Bass and Avolio (1994). It is imperative to examine how these policies align with the innovation objectives of the mining company. From a transformational leadership perspective, following the ideas of authors such as Burns (1978), this analysis takes on a deeper dimension, extending beyond operational efficiency to embrace the creative and motivational essence of leadership.

The ability to develop and retain talent, in line with the transformational leadership principles proposed by Bass and Riggio (2006), together with the creation of an environment that not only tolerates but also fosters creativity, become fundamental aspects that must be considered in an integral manner in strategic planning. While transformational leadership is linked to inspiring innovation, studies such as Yukl (2008) and Salgado Escobar et al. (2022) suggest that transactional leadership, focused on setting clear expectations and rewards, can also play a crucial role in creating an organizational climate for innovation. Integrating both leadership styles into the organizational climate for innovation can thus enhance innovation and progress in the mining company studied.

The results highlight that transformational leadership, specifically through idealized behavioral influence, inspirational motivation, intellectual stimulation, individualized consideration and contingent reward are fundamental to creating a positive organizational climate for innovation in the mining company studied.

It is concluded that leaders must adopt a transformational approach to foster a work environment conducive to innovation. The ability of mining company leaders to positively influence and motivate

through strategies that stimulate the mind and consider individual needs contributes directly to the development of an organizational climate that nurtures creativity and innovation.

These findings reinforce the intrinsic connection between effective leadership and the promotion of innovation. Mining company leaders who practice idealized influence and prioritize intellectual stimulation and individualized consideration not only inspire their teams, but also lay the foundation for a dynamic, collaborative work environment that drives the generation of novel ideas and the successful implementation of innovative solutions. In summary, the adoption of transformational leadership proves to be an essential catalyst for the creation of a climate of innovation in organizations, accompanied by other styles such as transactional.

## REFERENCES

- Alcázar Cruz, P. (2020). Estilo de Liderazgo y Compromiso Organizacional: Impacto del liderazgo transformacional. *Economía Coyuntural*, 5(4), 89-122. <https://www.iies.uagrm.edu.bo/vol-5-no-4-2020-estilo-de-liderazgo-y-compromiso-organizacional-impacto-del-liderazgo-transformacional/>
- Anderson, N. R., & West, M. A. (1998). Measuring climate for work group innovation: Development and validation of the team climate inventory. *Journal of Organizational Behavior*, 19(3), 235-258. [https://doi.org/10.1002/\(SICI\)1099-1379\(199805\)19:33.0.CO;2-C](https://doi.org/10.1002/(SICI)1099-1379(199805)19:33.0.CO;2-C)
- Araya Pizarro, S. C. (2019). Cultura innovativa de una escuela de turismo en Chile. *Estudios y perspectivas en turismo*, 28(1), 167-184. <https://dialnet.unirioja.es/servlet/articulo?codigo=6733402>
- Bass, B. M., & Avolio, B. J. (1994). *Improving Organizational Effectiveness Through Transformational Leadership*. SAGE Publications. <https://us.sagepub.com/en-us/nam/improving-organizational-effectiveness-through-transformational-leadership/book4228>
- Bass, B. M., & Avolio, B. J. (1997). *Revised manual for the Multifactor Leadership Questionnaire*. Mind Garden.

Bass, B. M., & Riggio, R. E. (2006). *Transformational Leadership*. Psychology Press.

<https://doi.org/10.4324/9781410617095>

Burns, J. M. (1978). *Leadership*. Harper y Row.

Cangahuala Sedano, J. A., & Salas Zeballos, V. R. (2022). Sistema de gestión de seguridad y salud ocupacional para la prevención de accidentes laborales en empresas mineras. *Llamkasun*, 3(1), 112-118. <https://doi.org/10.47797/llamkasun.v3i1.90>

Galarza Torres, S. P., Carrillo Punina, A. P., Aragón Taco, J. E., & Noroña Gallo, D. M. (2022). Military Leadership in the Ecuadorian Army. En *Applied Technologies: 4th International Conference, ICAT 2022* (Vol. 1755, pp. 344-359). Springer Nature Switzerland.

[https://doi.org/10.1007/978-3-031-24985-3\\_25](https://doi.org/10.1007/978-3-031-24985-3_25)

Galarza Torres, S. P., Carrillo Punina, Á. P., & Carillo Punina, L. P. (2019). Estilos de liderazgo en las Cooperativas de Ahorro y Crédito ecuatorianas: Modelo lineal de equilibrio en resultados. *ECA Sinergia*, 10(2), 96-107. [https://doi.org/10.33936/eca\\_sinergia.v10i2.1659](https://doi.org/10.33936/eca_sinergia.v10i2.1659)

Guerrero Bejarano, M. A., Añazco Camacho, K. A., Valdivieso Salas, R. P., & Sánchez Córdova, Ó. W. (2018). Los Estilos de Liderazgo y su efecto en la Satisfacción Laboral. *INNOVA Research Journal*, 3(10), 142-148. <https://doi.org/10.33890/innova.v3.n10.2018.908>

Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. *American Psychologist*, 57(9), 705-717.

<https://doi.org/10.1037/0003-066X.57.9.705>

Northouse, P. G. (2018). *Leadership: Theory and Practice*. SAGE Publications.

<https://search.worldcat.org/es/title/Leadership-:-Theory-and-Practice/oclc/1043034876>

Patterson, M. G., West, M. A., Shackleton, V. J., Dawson, J. F., Lawthom, R., Maitlis, S., Robinson, D. L., & Wallace, A. M. (2005). Validating the organizational climate measure: Links to managerial practices, productivity and innovation. *Journal of Organizational Behavior*, 26(4), 379-408. <https://doi.org/10.1002/job.312>

Pedraja Rejas, L., Bernasconi, A., Coluccio Piñones, G., Marchioni Choque, Í., Espinoza Marchant, C., & Muñoz Fritis, C. (2019). Cultura y estilos de liderazgo en unidades académicas: Un

estudio en una institución de educación superior. *Utopía y Praxis Latinoamericana*, 24(Extra 4), 25-35. <https://produccioncientificaluz.org/index.php/utopia/article/view/29819>

Rodríguez Álvarez, H., Martínez Quezada, A., Orrego Bugueño, J., & Vargas Morán, J. (2018). Identificación del estilo de liderazgo en la compañía minera Punta de Lobos, Iquique-Chile. *Perspectiva*, 19(3), 377-391. <https://revistas.upagu.edu.pe/index.php/PE/article/view/594>

Román Bermeo, C. L., Peñaherrera Palma, K. I., & Riccio Morales, K. D. (2023). Planeación estratégica empresarial y cultura de innovación: Una revisión de literatura. *Visión Empresarial*, 1(2), 10-25. <https://revistasdigitales.uniboyaca.edu.co/index.php/viem/article/view/827>

Salgado Escobar, G., Aguilar Fernández, M., & Cárdenas González, J. H. (2022). Transformational leadership and its relationship with organizational innovation and green: A literature review. *Administración y Organizaciones*, 25(48), 106-132. <https://doi.org/10.24275/uam/xoc/dcsh/rayo/2022v25n48/Salgado>

Sánchez Campos, P. A., & Siles Ortega, B. (2023). Revisión del concepto de comportamiento innovador y comportamiento innovador en el trabajo. *Innovar*, 33(89), 99-103. <https://doi.org/10.15446/innovar.v33n89.107043>

Yukl, G. A. (2008). *Liderazgo en las organizaciones*. Pearson Educación.



### **Conflict of interest**

Authors declare that they have no conflicts of interest.

### **Authors' contribution**

*Jorge Oswaldo Proaño Vargas* designed the structure of the article, collected data, performed the statistical analysis and wrote the article.

*Angie Fernández Lorenzo* directed the project, participated in the analysis and writing.

Both authors approved the version finally submitted to the journal.



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License