LEX LOCALIS-JOURNAL OF LOCAL SELF-GOVERNMENT
ISSN:1581-5374 E-ISSN:1855-363X
VOL. 23, NO. 1 (2025)

THE RELATIONSHIP BETWEEN THE USE OF MODERN LEADERSHIP STYLES AND ORGANIZATIONAL COMMITMENT TO ENVIRONMENTAL RESPONSIBILITY:A FIELD STUDY AT THE HAUTS PLATEAUX TANNERY IN DJELFA

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Received: 14/01/2024 ; Accepted: 17/01/2025 ; Published: 27/01/2025

Abstract:
This study examines the extent to which modern leadership styles (transactional, transformational, and ethical leadership) are practiced at the Hauts Plateaux Tannery in Djelfa, Algeria, and assesses the organization's commitment to environmental responsibility. It also investigates the relationship between these variables and explores differences in respondents' assessments according to their demographic and occupational characteristics. A questionnaire was developed based on previous research addressing both variables and administered to a random sample of 60 employees. Data were analyzed using SPSS, and a chi-square (χ^2) test was used to examine the association between modern leadership styles and environmental responsibility. The findings indicate high levels of both modern leadership practice and commitment to environmental responsibility. Respondents' assessments of leadership styles did not differ by demographic or occupational characteristics. Their assessments of environmental responsibility did not differ by gender or educational qualifications, but differences were observed by age and work experience. The chi-square analysis indicated a significant association between the practice of modern leadership styles and the tannery's commitment to environmental responsibility.

Keywords: Transactional leadership; transformational leadership; ethical leadership; environmental responsibility.

Introduction:

Sustainable development (SD) recognizes that depleting natural resources essential to agricultural and industrial activities can harm economic and social development. A central principle of SD is balancing economic activity with ecosystem protection, conserving natural resources, and respecting environmental limits. Organizations therefore play an important role in reducing the environmental impacts of their activities while maintaining operational and economic performance. Because humanity shares a common environment and atmosphere, environmental damage can extend beyond geographical and economic boundaries. Environmental protection is therefore a collective responsibility that requires cooperation among governments, organizations, and individuals. For industrial organizations, this responsibility includes reducing pollution, using resources efficiently, and integrating environmental considerations into managerial decisions. At the opening session of the first Conference on the Human Environment in Stockholm in 1972, the Secretary-General of the Conference, Maurice Strong, said: "We have all come here to affirm our responsibility toward the environmental problems of the Earth we all share. Consequently, the issue of preserving, protecting, and managing the environment has become a global imperative and a collective moral responsibility." This was reaffirmed by the Environmental Outlook report issued by UNICEF and the report *Our Common Future* issued by the World Commission on Environment and Development, which stated that: "Environmental sustainability is the backbone of all development activities, and safeguarding and improving the environment for future generations has become humanity's primary goal—a goal that must be pursued alongside the fundamental goals of global peace and socioeconomic development. All of this requires integrating environmental, social, economic, and educational issues into the solution". Leadership plays an important role

in an organization's continuity and development. Management literature identifies several leadership approaches, including transactional, transformational, and ethical leadership. These approaches differ in how leaders motivate employees, guide performance, make decisions, and establish ethical standards. Understanding their potential contribution to environmental responsibility is particularly relevant for industrial organizations whose activities may have significant environmental impacts. Among these approaches, the most contemporary are transformational leadership (TFL) and transactional leadership (TL). Ethical leadership is another approach. A good leader clearly understands organizational goals and is always prepared to achieve them, even in difficult times. Such a leader also pays close attention to ideas that deserve serious consideration and is always extremely cautious.

Main Research Problem and Sub-Questions

This study addresses the relationship between modern leadership styles and organizational commitment to environmental responsibility in Djelfa Province, Algeria. The main research question is as follows:

What is the relationship between modern leadership styles and environmental responsibility at the Upper Plateaus Tannery in Djelfa,?

This raises the following questions:

1. To what extent are transactional, transformational, and ethical leadership practiced at the Upper Plateaus Tannery?
2. How do employees assess the organization's commitment to environmental responsibility?
3. Are there statistically significant differences in employees' responses to the study variables by gender, age, educational qualification, and work experience?
4. Is there a statistically significant relationship between transactional, transformational, and ethical leadership and environmental responsibility?

Research Hypotheses

- First hypothesis: The management at the Upper Al-Hadab Tannery does not carry out its duties using modern leadership styles at a significance level of $\alpha \leq 0.05$
- Second hypothesis: The management at the Upper Al-Hadab Tannery does not adhere to environmental responsibility at a significance level of $\alpha \leq 0.05$
- Third hypothesis: There are no statistically significant differences in employees' responses concerning TL, TFL, ethical leadership, and environmental responsibility according to gender, age, educational qualification, or work experience ($\alpha = 0.05$).
- There is no statistically significant association between transactional, transformational, and ethical leadership and environmental responsibility at the Upper Plateaus Tannery in Djelfa ($\alpha = 0.05$).

➢ **Significance of the study**

This study is significant because it examines modern leadership styles as potential approaches to strengthening organizational performance and environmental responsibility. It assesses transactional, transformational, and ethical leadership at the Upper Plateaus Tannery in Djelfa, evaluates employees' perceptions of environmental responsibility, and investigates whether these perceptions differ by demographic and occupational characteristics. The findings may provide practical insights for managers seeking to integrate environmental considerations into organizational practices and decision-making.

➢ **Objectives of the Study:** The objectives of this study are:

- ✓ To explain the main concepts and characteristics of modern leadership styles.
- ✓ To examine environmental responsibility and its principal dimensions.
- ✓ To assess the extent to which transactional, transformational, and ethical leadership are practiced at the Upper Plateaus Tannery.
- ✓ To evaluate employees' perceptions of the organization's commitment to environmental responsibility.
- ✓ To investigate the relationship between modern leadership styles and environmental responsibility.
- ✓ To examine differences in employees' responses according to gender, age, educational qualification, and work experience.

Theme 1: Modern Leadership Styles

The subject of leadership has been linked to humanity since ancient times; research and studies have shown that the great goals of every society cannot be achieved without a group, and a group cannot be organized

without a leader to coordinate its efforts towards that goal; indeed, a large part of a society's future development rests in the hands of its leaders.[1] Leadership styles are numerous and varied, reflecting the diversity of organizations and differences in personalities, roles, functions, and situations; each style has distinctive characteristics that set it apart from the others.[2] This study focuses on three leadership styles: TL, TFL, and ethical leadership. These styles were selected because they correspond to the dimensions assessed by the research questionnaire.

❖ **Modern leadership styles selected for study**

1. Transactional Leadership:

- TL is based on an exchange relationship between leaders and followers. Leaders set clear expectations, define responsibilities, monitor performance, and provide rewards or corrective measures based on how well employees meet specified objectives.[3]
- TL involves an exchange between leaders and followers in which leaders provide rewards or other benefits in return for specified performance or outcomes.[4]
- TL approaches focus on an exchange process between leaders and followers. This involves the leader clearly outlining expectations and conditions, along with the rewards granted upon meeting them.[5]

We therefore arrive at the following definition: reciprocal leadership is a leadership style based on a reciprocal relationship between the manager and their subordinates, whereby the manager focuses on results and works to direct the actions of their subordinates so that they comply with what is expected of them, by influencing them through rewards and incentives or penalties**.**

✓ Dimensions of TL: Reciprocal leadership is based on two dimensions, namely:[6]

✓ **Conditional reward**: Conditional reward refers to the exchange between leaders and employees, in which employees exchange effort for specific rewards. Conditional rewards occur when a leader rewards or punishes a subordinate based on performance quality. Subordinates accept the manager's or leader's promises of rewards or avoidance of punishment in return for carrying out the required tasks to the required standard.

✓ **Management by exception**: This leadership style focuses on corrective criticism and highlights errors and negative outcomes through feedback, intervening when an employee fails to meet required performance standards to address and resolve these issues. Hatter and Bass distinguished between negative management by exception, in which the leader refrains from intervention until performance issues requiring corrective action arise. At that point, they take action only after blaming and criticizing staff and imposing sanctions and penalties for negligence or misconduct. In contrast, positive management by exception involves actively supervising employees' activities to prevent errors or performance deviations.

2. Transformational leadership

James MacGregor Burns introduced the concept of TFL in his 1978 book Leadership. He distinguished leadership that motivates followers through shared purposes and values from leadership based primarily on exchanges between leaders and followers.[7].

- TFL involves a process where both the leader and their followers strive to elevate each other's motivation and ethical standards.[8]
- A transformational leader effectively fosters change among subordinates by engaging them in three key areas. First, they raise subordinates' awareness of the significance and value of their work outcomes. Second, they inspire subordinates to prioritize the team's or organization's collective interests over individual gains. Lastly, they influence or broaden subordinates' needs, aligning them with Maslow's hierarchy of needs[9].
- It is the leadership style that occurs when leaders work to promote the interests of their subordinates, or when leaders work to generate greater interest, awareness, and acceptance of the organization's purpose and mission amongst their subordinates[10]

  We therefore arrive at the following definition: TFL is a leadership style that seeks to achieve collective agreement by integrating individual and organizational interests. It also involves assessing the performance of subordinates and motivating them to improve their performance and meet their needs and aspirations, with a view to bringing about changes and developments within the organization to address changes in the external environment.

▪ **Dimensions of TFL**: Leadership theory has evolved through the contributions of Bass, who developed models and scales to measure factors of leadership behavior; this is known as the MLQ (Multidimensional Leadership Questionnaire), which comprises three components of TFL: charisma, creative encouragement,

and concern for the individual. In 1990, Bass added a fourth component, which he termed inspired motivation.[11]

The dimensions of TFL are as follows:[12]

✓ **The ideal influence**: 'charisma': This refers to a leader's ability to establish a clear vision and a sense of the organization's higher purpose, instill a spirit of pride and honor, foster respect and trust among subordinates, and persuade them to achieve these goals. In other words, it is the leader's ability to earn the trust, admiration, and respect of followers who regard them as a role model, emulate them, and willingly comply with their requests.

✓ **Inspirational motivation**: This is the leader's ability to convey high expectations to others and use symbols to focus efforts and express important objectives simply.

✓ **Intellectual stimulation**: The leader's ability and willingness to encourage their followers to tackle old problems in new ways and to teach them to view difficulties as problems requiring a solution and to seek logical solutions to them

✓ **Individual consideration**: This refers to a leader's concern for subordinates, offering encouragement, guidance, and advice, and paying attention to their specific needs, as these vary from person to person.

3. Ethical leadership

Ethical leadership can strengthen an organization's reputation by promoting integrity, fairness, accountability, and responsible decision-making. By demonstrating ethical conduct and communicating clear ethical expectations, leaders may encourage employees to behave responsibly towards colleagues, stakeholders, and the environment. [13]

We note that the concept of ethical leadership consists of two words: 'leadership' and 'ethics'. Researchers have only recently begun to investigate this concept, driven by growing interest in business ethics and the discovery of unethical behavior by leaders in certain organizations. Having reviewed previous studies, we have decided to present some definitions of ethical leadership:

- Ethical leadership involves more than just the leader's character and intentions; it also encompasses the ethical nature of their processes and the moral impact of their decisions on both followers and society.[14]
- Demonstrating normatively appropriate behavior through one's actions and relationships, while promoting this behavior to followers using open communication, positive reinforcement, and thoughtful decision-making.[15]
- Ethical leadership has also been defined as the practical demonstration of naturally appropriate behavior through personal conduct and interpersonal relationships, and the promotion of such behavior amongst staff through two-way communication and decision-making.

Based on the reviewed literature, ethical leadership is a leadership approach grounded in integrity, fairness, accountability, and ethical decision-making. Through their conduct and interactions with employees, ethical leaders may promote responsible workplace behavior and strengthen employees' awareness of their social and environmental responsibilities.

➢ **Dimensions of ethical leadership**: According to the study conducted by Jawad Mohsen Radi and Abdullah Kazim Hassan:[16]

- Ethical behavior is a key component of leadership; it is essential to an individual's success as a leader within an organization, and various models of organizational effectiveness and leadership confirm that attention to ethical issues is a fundamental element of leadership. These ethical qualities include integrity, justice, honesty, respect, fairness, loyalty, tolerance, courage, and trustworthiness.
- **Ethical behavior:** As employees learn values, beliefs, and objectives by observing and monitoring a leader's behavior, the leader must make ethics the cornerstone of the organization's way of working by practicing ethical behavior in their personal life, within the organization, and in their relationships. The most important characteristics that distinguish the behavior and practices of an ethical leader are: avoiding causing harm to others; respecting the rights of others; not being deceitful; honoring one's commitments; obeying the law; preventing harm to others; assisting others with their needs; being fair; and promoting these principles among others.
- Promoting ethical behavior:

Managers can promote ethical behavior through the following:

- Acting ethically: A leader who can serve as a strong role model is one whose actual behavior and skills convey a clear message about the importance of acting ethically.
- Monitoring staff and disciplining those who deviate from ethical behavior
- Developing valuable codes of ethics.
- Providing ethics training.

environmental responsibility

Once managers realized that social responsibility is not confined solely within the organization but extends beyond its boundaries to encompass numerous external parties and groups, a new concept emerged: the 'environmental concept' or 'social environment model', regarded as the most up-to-date and environmentally relevant concept. Various research papers and studies highlighted this, with a key example being Ralph Nader and John K. Galbraith's study of large industrial organizations and their impact on society. They concluded that "When the general social interest is at stake, no natural right takes precedence over that interest"—meaning that the public interest of society is a priority for the organization and takes precedence over any self-interest. Consequently, the concept of social responsibility is based on the extent to which the interests of society are served whilst achieving long-term profits, whilst taking into account and meeting the needs of individuals and preserving the environment, which is regarded as everyone's responsibility."[17]

The concept of environmental responsibility (the environmental dimension of social responsibility):

This concept has been referred to by various names: some call it the 'social-environmental model', others the 'qualitative model of managers' lives', and still others the 'public perspective model', amongst other terms, all of which reflect the view that this is the most modern concept and the one most closely linked to the environment. We can therefore describe it as the modern environmental concept of social responsibility. This concept, whose contours began to emerge in 1960, reflects managers' realization that their social responsibility is not confined to the organization but extends to various groups and stakeholders representing society at large.[18]

Consequently, environmental responsibility constitutes the environmental dimension of social responsibility. It relates to conserving physical and biological resources—such as the optimal use of agricultural land and water resources, biodiversity, and the preservation of the global climate—through the principles underpinning SD from an environmental .perspective

Field Study at the Upper Plateaus Tannery in Djelfa. This section includes an analysis of the research instrument, personal data, and study variables using SPSS. It also includes hypothesis testing.

Field Study at the Upper Plateaus Tannery in Djelfa. This section includes analyses of the research instrument, the personal data, and the study variables using SPSS. It also includes hypothesis testing.

First: Results of the data analysis

Before discussing the analysis of the personal data, it is essential to consider the instrument used in the study and its validity and reliability.

Analysis of the study instrument

A questionnaire was developed based on previous studies examining modern leadership styles and environmental responsibility. It consisted of two parts. The first collected demographic and occupational information, including gender, age, educational qualification, and work experience. The second assessed the study variables through four dimensions: TL, TFL, ethical leadership, and environmental responsibility. The questionnaire consists of two parts:

Part One: This includes personal and professional details (gender, age, educational qualifications, experience)

Part Two: This covers the following areas:

The first dimension: Modern leadership styles (independent variable)

This is divided into three dimensions:

- **The first dimension**: TL, measured by items (1–6).
- **The second dimension**: TFL, measured by items (7–15).
- **The third dimension**: Ethical leadership, measured by items (16–22).

Axis 2: Environmental responsibility (dependent variable), measured by items.(31–23)

❖ **Study population and sample:**

The study population comprised 110 employees at the Upper Plateaus Tannery. A total of 70 questionnaires were distributed, of which 65 were returned. Five questionnaires were excluded because they were unsuitable for analysis, resulting in a final sample of 60 respondents,

❖ **Statistical methods used to analyze the data in this study:** To achieve the study's objectives and analyze the collected data, we used SPSS statistical software. We also employed several statistical methods appropriate to the nature and objectives of the study, as follows:

 The **Kolmogorov–Smirnov** (K-S) test and the Shapiro–Wilk test: to determine the nature of the distribution and identify the appropriate tests.

 Spearman's correlation coefficient: to assess the internal consistency of the study instrument

 Cronbach's alpha (α): to assess the reliability of the study; the closer the value is to one, the greater the reliability.

 Frequencies and percentages to describe the characteristics of the study sample.

- **Non-parametric tests:**

✓ The sign test was used to assess whether responses differed significantly from the specified reference value. The reference value and the corresponding null hypothesis should be stated explicitly.

✓ The Mann–Whitney U test was used to compare the distributions of responses between two independent groups.

✓ The Kruskal–Wallis H test was used to compare response distributions across three or more independent groups.

✓ The chi-square test of independence was used to examine the association between the leadership-style variables and environmental responsibility. The analysis was interpreted using a significance level of 0.05, with the assumptions of the test checked before conclu.ding

1. **Normality Test:** To identify the appropriate tests for verifying the field study's hypotheses, it is necessary to determine the nature of the data distribution. To this end, we conducted the Kolmogorov–Smirnov (K-S) and Shapiro–Wilk tests. Table 1 shows the results obtained.

Table No. (01): Test for normal distribution of data.

Type of test **Domain**	Test (Kolmogorov-Smirnov Test, K-S)		Test (Shapiro-Wilk	
	Test Value	**P-value. Sig**	**Test Value**	**P-value. Sig**
Transactional Leadership	0.394	0.000	0.632	**0.000**
TFL	0.368	0.000	0.608	**0.000**
Ethical leadership	0.367	0.000	0.678	**0.000**
Environmental responsibility	0.280	0.000	0.736	**0.000**
Total	0.24	0.000	0.693	**0.000**

Source: Compiled by the researchers based on the output of the SPSS program.

The table above shows that the significance value (Sig) for all ranges was below the significance level of 0.05. The reported p-values for the study dimensions were below 0.05, indicating statistically significant departures from normality. Accordingly, non-parametric methods were used for the subsequent analyses.

❖ **Secondly:** The validity and reliability of the questionnaire

1. Internal consistency of the questionnaire items: The internal consistency of the questionnaire items was calculated by determining the correlation coefficients between each item and its respective dimension, using Spearman's correlation coefficient**.** Table 2 presents the correlation coefficients between each item and its dimension's overall score.

2.

Table No. (02): Correlation coefficients between the items and the overall score for the dimensions to which they belong.

TL		TFL		Ethical leadership	
Paragraph number	Correlation coefficient	Paragraph number	Correlation coefficient	Paragraph number	**Correlation coefficient**
01	0.990**	**07**	0.859**	**16**	**0.739****
02	0.845**	**08**	0.817**	**17**	**0.890****
03	0.871**	**09**	0.817**	**18**	**0.867****
04	0.846**	**10**	0.963**	**19**	**0.890****
05	0.845**	**11**	0.817**	**20**	**0.867****
06	0.845**	**12**	0.817**	**21**	**0.814****
		13	0.817**	**22**	**0.781****
		14	0.817**		
		15	0.817**		
				Environmental responsibility	
				23	**0.700****
				24	**0.700****
				25	**0.916****
				26	**0.920****
				27	**0.700****
				28	**0.728****
				29	**0.486****
				30	**0.732****
				31	**0.773****

Source: Compiled by the researchers based on the output of the SPSS program.

The table shows that the correlation coefficients between the various dimension items and the dimensions as a whole are high, with most exceeding 60%; the highest was 99%, while the lowest was 48%. This indicates internal consistency among the items and that each item reflects the dimension. The results are significant at the 0.01 level and below.

3. **Reliability of the questionnaire items:** Reliability was assessed using Cronbach's alpha to measure the reliability of the research instrument. Table 3 illustrates the reliability coefficients for the study instrument (Cronbach's alpha).

Table No. (03): Reliability coefficients for the study instrument (Cronbach's alpha).

Statement	Number of paragraphs	Cronbach's alpha
TL	06	**0.981**
TFL	09	**0.984**
Ethical leadership	07	**0.963**
Environmental responsibility	07	**0.957**
The questionnaire as a whole	31	**0.990**

Source: Compiled by the researchers based on the output of the SPSS program.

The questionnaire achieved an overall Cronbach's alpha coefficient of 0.990, indicating very high internal consistency. However, Cronbach's alpha assesses reliability rather than validity and does not imply that repeated administrations will produce identical results with 99% certainty. The reliability coefficients for the individual dimensions should also be reported, where available.

4. Analysis of the study data

This section presents the statistical analysis of the study sample's personal and occupational data by detailing the sample's characteristics and calculating frequencies and percentages. Table 4 shows the personal and occupational characteristics of the study sample.

Table No. (04): Personal and occupational characteristics of the study sample.

Statement	**Gender**		**Age**			**Academic Qualification**		
	Male	Female	Under 30	30 to 39	Over 40	Secondary school	University	**Vocational training**
Frequency	54	6	16	25	12	10	24	**26**
Proportion	88.5	9.8	26.2	41	31.1	16.4	39.3	**42.6**

Experience			
	Less than 5 years	Between 5 and 15 years	**More than 15 years**
Frequency	23	27	**10**
Proportion	37.7	44.3	**16.4**

Source: Compiled by the researchers based on the output of the SPSS program.

Secondly: Testing the study's hypotheses

1. **First Hypothesis:** To analyse the questionnaire items, we used the sign test, based on the following hypothesis:

Null hypothesis: The median response score equals the neutral score, which is (3)

Alternative hypothesis: The median response score does not equal 3

If the p-value is greater than the significance level of 0.05 = α, we accept the null hypothesis; in this case, the median of the sample's responses to the study's key statements does not differ from the neutral score. Conversely, if the p-value is less than 0.05, the null hypothesis is rejected, and the alternative hypothesis is accepted.

- **The Alternating Leadership Dimension**: This consists of six items arranged in the questionnaire as follows (01, 02, 03, 04, 05, 06). Following the administration of the test, the results are shown in Table 5.

Table No. (05): Results of the signal test for the statements relating to Transactional Leadership.

Statement	**Number of positive**	**Number of negative**	**Number of neutral**	**responses z-score**	**Significance level**	**Overall mean**	**Level of agreement**
1 My line manager expresses satisfaction when I have achieved what was expected of me	06	20	32	2.079-	0.038	04	**Agree**
2. My line manager imposes sanctions if my performance does not meet the required standards	02	26	32	4.347-	0.000	04	**Agree**
3. My line manager discusses the idea of conditional rewards with subordinates	03	25	32	3.969-	0.000	04	**Agree**
.4 My line manager makes a point of providing me with feedback on my performance to help me improve. 4.	02	26	32	4.374-	0.000	04	**Agree**
5. My line manager lets me get on with my work without interfering, unless my performance falls short of the desired targets.	02	26	32	4.347-	0.000	04	**Agree**
6. My line manager focuses their attention solely on addressing exceptional problems.	02	26	32	-4.347	0.000	04	**Agree**
Transactional Leadership	04	24	32	-3.591	0.000	3,7139	**High**

Source: Compiled by the researchers based on the output of the SPSS program.

It is evident from the table above that the majority of the sample's attitude towards the 'shared leadership' dimension was highly favourable, as reflected by the overall mean for this dimension, which stood at (4), as 4 workers (out of a total of 60) held views on this dimension that were above the neutral point, whilst the z-score was statistically significant as the p-value was 0.000, which is less than 0.05, Consequently, there is a difference between the sample's median opinion and the neutrality score (3), and the z-score is statistically significant across all items in this dimension, as the p-value is 0.000, which is less than the significance level of 0.05, Consequently, there is a statistically significant difference between the median of the sample's responses to each item and the median of the scale used.(3)

❖ **TFL Dimension:** This consists of nine items arranged in the questionnaire as follows (07, 08, 09, 10, 11, 12, 13, 14, 15). Following the analysis, the findings are presented in Table 6.

Table No. (06): Results of the signal test for statements relating to TFL.

Statement	Number of positive	Number of negative	Number of neutral	responses z-score	Significance level	Overall mean	Level of agreement
.7 My line manager behaves impeccably	03	25	32	-3.969	0.000	04	**Agree**
.8 My line manager creates a working environment in which subordinates feel comfortable working under his or her leadership	01	27	32	-4.725	0.000	04	**Agree**
.9My line manager encourages me to achieve more than I had expected.	01	27	32	-4.725	0.000	04	**Agree**
10. My line manager inspires my ideas	08	20	32	-2.079	0.038	04	**Agree**
11. My line manager suggests new ways and ideas for getting the job done	01	27	32	-4.725	0.000	04	**Agree**
12. My line manager seeks out different, creative perspectives	01	27	32	-4.725	0.000	04	**Agree**
13. My line manager helps me to demonstrate my abilities and potential	01	27	32	-4.725	0.000	04	**Agree**
14. My line manager treats us equally and fairly	01	27	32	-4.725	0.000	04	**Agree**
15. My line manager takes an interest in me because I have different needs, abilities and ambitions from others	01	27	32	-4.725	0.000	04	**Agree**
TFL	04	24	32	-3.591	0.000	3,7463	High

Source: Compiled by the researchers based on the output of the SPSS program.

It is evident from the table above that the majority of the sample exhibited a high level of agreement regarding the TFL dimension, as reflected by the overall arithmetic mean for this dimension, which stood at (3.7463), as four workers (out of a total of 60) held views on this dimension that exceeded the neutrality score, whilst the sign test value was statistically significant as the p-value was 0.000, which is less than 0.005. Consequently, there is a difference between the sample's median opinion and the neutrality score (3), and the z-score is statistically significant for all items within this dimension, as the p-value is 0.000, which is less than the

significance level of 0.05. Consequently, there is a statistically significant difference between the median of the sample's responses on each item and the median of the scale used (3).

- **The Ethical Leadership dimension:** This consists of seven items arranged in the questionnaire as follows (16, 17, 18, 19, 20, 21, 22). Following the administration of the questionnaire, the results are shown in Table 7.

Table No. (07): Results of the signal test for statements relating to the ethical leadership dimension.

Statement	Number of positive	Number of negative	Number of neutral	responses z-score	Significance level	Overall mean	Level of agreement
16. Managers promote ethical principles in speeches and meetings in an effort to put them into practice.	09	19	32	-1.701	0.089	04	**Agree**
17. Managers reject unethical business practices, even if they would benefit the organisation.	04	24	32	-3.591	0.000	04	**Agree**
18. Managers hold meetings and gatherings that encourage staff to adhere to ethical behavior.	04	24	32	-3.591	0.000	04	**Agree**
19. Leaders honor the promises they make to staff.	04	24	32	-3.591	0.000	04	**Agree**
20. Leaders apply the rules equally to themselves and to staff.	04	24	32	-3.591	0.000	04	**Agree**
21. Leaders take disciplinary action against those who breach ethical standards.	02	26	32	-4.347	0.000	04	**Agree**
22. Leaders do not define success solely by results, but by the means by which they are achieved.	01	27	32	4.725	0.000	04	**Agree**
Ethical Leadership	09	19	32	-1.701	0.089	3,6762	**Average**

Source: Compiled by the two researchers based on SPSS output.

The table above shows that most of the sample held a moderately positive view of ethical leadership, as reflected in the overall median for this dimension, which stood at 4. Nine workers (out of a total of 60) held views on this dimension that were more favourable than the neutral score, whilst the z-score was not statistically significant as the p-value (0.089) was greater than 0.005, Consequently, there is no difference between the sample's median opinion and the neutrality score (3), whilst the z-score is statistically significant in items (17, 18, 19, 20, 21 and 22) as the p-value is 0.000, which is less than the significance level of 0.05. Consequently, there is a statistically significant difference between the median scores of the sample participants for each item and the median of the scale used (3). For item 16, the significance level is 0.089, which is greater than 0.005; therefore, this item is not statistically significant, and there is no statistically significant difference between the median of the sample's responses and the scale median (3).

- **The second hypothesis**

The environmental responsibility subscale consists of nine items arranged in the questionnaire as follows (23, 24, 25, 26, 27, 28, 29, 30, 31). The results of the sign test are shown in Table 8.

Table No. (08): Results of the sign test for statements relating to the environmental responsibility axis

Statement	Number of positive	Number of positive	Number of neutral	responses z-score	Significance level	Overall mean	Level of agreement
23. The organization complies with government regulations relating to the environment	01	27	32	4.725-	0.000	04	**Agree**
24. Environmental protection is one of the key pillars of the organization's management values and corporate culture	01	27	32	4.725-	0.000	04	**Agree**
25. The organization uses modern technologies to prevent soil, water, and air pollution	19	09	32	1.701-	0.089	04	**Agree**
26. The organisation uses modern technologies to dispose of waste and manufacturing by-products.	21	07	32	2.457 -	0.014	04	**Agree**
27. The organization conducts awareness-raising sessions to educate employees on the importance of environmental protection and safety.	01	27	32	4.725 -	0.000	0.4	**Agree**
28 The organization prepares reports on its environmental performance.	07	21	32	2.457-	0.014	0.4	**Agree**
29 The organization implements the ISO 14000 international environmental management standards	04	24	32	3.591-	0.000	0.4	**Agree**
30 The organization ensures the economical and optimal use of raw materials and energy sources in its production processes.	03	25	32	3.969 -	0.000	0.4	**Agree**
31. The organization has an emergency plan in place in the event of natural disasters	06	22	32	2.835 -	0.005	0.4	**Agree**
Environmental Responsibility	24	04	32	3.591-	0.000	3,6259	**Average**

Source: Compiled by the researchers based on the output of the SPSS program.

It is evident from the table above that the majority of the sample's attitude towards environmental responsibility was favorable at a moderate level, as reflected by the overall arithmetic mean for this dimension, which stood at (3.6259); 24 workers out of (a total of 60) held views on this dimension that were more favorable than neutral, whilst the z-score was statistically significant as the p-value was 0.000, which is less than 0.05. Consequently, there is a difference between the sample's median opinion and the neutral point (3). The z-score is statistically significant in items (23, 24, 26, 27, 28, 29, 30 and 31) as the p-value is 0.000, which is less than the significance level of 0.05; consequently, there is a statistically significant difference between the median of the sample's responses for each item and the median of the scale used (3), As for item 25, the significance level is 0.089, which is greater than the significance level of 0.005; this item is not statistically significant, and therefore there is no statistically significant difference between the median of the sample's responses and the median of the scale used.(3)

- ❖ **Hypothesis 3**: The Differences Hypothesis

- **The extent to which the gender variable influences the study sample's responses to the study's themes:** To measure this, we conducted a Mann–Whitney test, and the results are shown in Table 9.

Table No. (09): Results of the Mann-Whitney test regarding the presence of statistically significant differences across the questionnaire dimensions attributable to gender

Key themes	Mean of ranks	z-test	Significance level

	Male	Female		
Transactional leadership	30.45	30.92	0.075 -	**0.952**
transformational leadership	30.38	31.58	0.194 -	**0.876**
ethical leadership	30.30	32.33	0.846 -	**0.801**
environmental responsibility.	31.54	21.17	1.435-	**0.176**

Source: Compiled by the researchers based on the output of the SPSS program.

We note from the results of this test, as shown in the table above, that the p-value is greater than 0.05; consequently, the mean score for males is equal to that for females, and therefore there are no statistically significant differences in the level of engagement with the study variables attributable to gender within the sample under study**.**

- **The extent to which the age variable influences the responses of the study sample regarding the study's themes:** To measure this, we conducted the Kruskal–Wallis test, and the results we obtained are shown in Table 10.

Table 10: Results of the Kruskal–Wallis test on the existence of statistically significant differences across the questionnaire dimensions attributable to age.

Key themes	Mean of ranks			z-test	Significance level
	Sample 1	Sample 2	Sample 3		
Transactional leadership	24.06	32.58	33.18	4.391	**0.111**
transformational leadership	27.56	28.74	53.29	3.149	**0.207**
ethical leadership	25.94	30.22	34.71	3.048	**0.218**
environmental responsibility.	30.78	23.02	40.11	11.176	**0.004**

Source: Compiled by the researchers based on the output of the SPSS program.

The results in the table above show that, for the dimensions of modern leadership styles (transactional, transformational, and ethical leadership), the significance level is greater than 0.05; consequently, the mean scores for these dimensions across the different age groups in the study sample are equivalent. In other words, from the sample's perspective, age does not statistically affect the level of practice of leadership styles. For the environmental responsibility dimension, the significance level is less than 0.05; consequently, the variable is statistically associated with differences in environmental responsibility. To identify the source of the difference, we conducted a Mann–Whitney test for each pair of the three samples; based on the results, we determined the source of the difference. After applying the Mann–Whitney test, we arrived at the results shown in Table 11.

Table 11: Results of the Mann-Whitney test regarding the presence of statistically significant differences across the questionnaire dimensions attributable to age.

Statement	**First difference**		**Second difference**		**Third difference**	
Sample	First	Second	First	Second	First	**Second**
Mean ranks	23.66	19.30	15.63	20.00	16.72	**30.11**
Statistical Z-score	1.160-		1.491-		**3.519-**	
Significance level	0.259		0.217		**0.000**	

Source: Compiled by the researchers based on the output of the SPSS program.

From the table above, we can see that the largest source of variation in the environmental responsibility dimension was between the second age group (aged 30-39) and the third age group (aged over 40)**.** The extent

to which academic qualification influences the study sample's responses to the study variables. To measure this, we carried out a Kruskal–Wallis test, and the results are shown in Table 12.

Table 12: Kruskal–Wallis test results on statistically significant differences across questionnaire dimensions attributable to educational qualification.

Key themes	Mean of ranks			z-test	Significance level
	Sample 1	Sample 2	Sample 3		
Transactional leadership	36.00	28.60	30.13	1.897	**0.387**
transformational leadership	37.00	27.52	30.75	3.080	**0.214**
ethical leadership	38.00	26.33	31.46	4.552	**0.103**
environmental responsibility.	36.50	25.54	32.77	3.842	**0.146**

Source: Compiled by the researchers based on the output of the SPSS program.

We note from the results in the table above that the significance level for the study's dimensions (transactional, transformational and ethical leadership, and environmental responsibility) is greater than 0.05, and therefore the mean scores for these dimensions across the different levels of academic qualification among the study sample are equal; that is, from the perspective of the sample, there are no statistically significant differences regarding the study variables attributable to academic qualification.

- **To assess how experience influences the study sample's responses to the study themes**, we conducted a Kruskal–Wallis test; the results are shown in Table 13.

Table 13: Kruskal–Wallis test results for statistically significant differences across questionnaire dimensions attributable to experience.

Key themes	Mean of ranks			z-test	Significance level
	Sample 1	Sample 2	Sample 3		
Transactional leadership	29.76	29.09	36.00	1.782	**0.410**
transformational leadership	27.24	30.87	37.00	3.242	**0.198**
ethical leadership	28.15	29.72	38.00	3.201	**0.202**
environmental responsibility.	29.43	25.85	45.50	10.135	**0.006**

Source: Compiled by the researchers based on the output of the SPSS program.

We note from the results above that the significance level for the dimensions of modern leadership styles (transactional, transformational and ethical leadership) is greater than 0.05; consequently, the mean scores for these dimensions across the various levels of experience within the organization for the study sample are equal, that is to say, from the sample's perspective, there are no statistically significant differences in the level of practice of leadership styles attributable to length of service within the organization. For the environmental responsibility dimension, the significance level is less than 0.05; consequently, length of service within the organization is associated with statistically significant differences in environmental responsibility. To identify the source of the difference, we conducted a Mann–Whitney test for each pair of the three samples. Based on the results, we can determine the source of the difference. After applying the Mann–Whitney test, we arrived at the results shown in Table 14.

Table 14: Results of the Mann-Whitney test on the existence of statistically significant differences in environmental responsibility attributable to organizational culture.

Statement	**First difference**		**Second difference**		**Third difference**	
Sample	First	Second	First	Second	First	**Second**
Mean ranks	26.61	24.56	14.83	22.00	15.30	**29.00**

Statistical Z-score	0.507-	2.187-	**3.564-**
Significance level	0.612	0.029	**0.000**

Source: Compiled by the researchers based on the output of the SPSS program.

From the table above, we can see that the source of variation on the environmental responsibility axis was between Category 1 (less than 5 years) and Category 3 (more than 15 years), and between Category 2 (between 5 and 15 years) and Category 3 (more than 15 years**).**

❖ **Hypothesis 4**

To assess the quality of the fit and the relationship between modern leadership styles and environmental responsibility, we conducted a chi-squared (X^2) test; the results are shown in Table 15.

Table 15: Chi-squared test results assessing the quality of fit.

The Statement	Chi-squared value X^2	Significance level
The relationship between TFL and environmental responsibility	98.685	**0.000**
The relationship between TFL and environmental responsibility	112.877	**0.000**
The relationship between ethical leadership and environmental responsibility	110.021	**0.000**

Source: Compiled by the researchers based on the output of the SPSS program.

From the table above, we can see that the p-value is less than the significance level of 0.05 for the relationship between each of the modern leadership styles and environmental responsibility; therefore, we reject the null hypothesis and can conclude, with 95 % confidence, that there is a relationship between modern leadership styles and environmental responsibility.

Conclusion

This study examined the relationship between modern leadership styles and environmental responsibility at the Upper Plateaus Tannery in Djelfa, Algeria. It focused on transactional, transformational, and ethical leadership and examined employees' assessments of environmental responsibility by demographic and occupational characteristics. The descriptive findings suggest that employees generally rated transactional and TFL more favorably, while assessing ethical leadership and environmental responsibility more moderately. These findings highlight the importance of considering different leadership approaches when examining how industrial organizations manage their environmental responsibilities. The demographic analyses indicated no statistically significant differences by gender or educational qualification, pending confirmation of the relevant test results. Differences associated with age and work experience were reported for environmental responsibility; these results should be interpreted in accordance with the Kruskal–Wallis and post-hoc comparison tables. The reported relationship between leadership styles and environmental responsibility should likewise be retained only after verification of the appropriate statistical test and its assumptions. Practically, the study recommends strengthening ethical standards, improving employees' environmental awareness, incorporating environmental considerations into managerial decisions, and regularly evaluating environmental performance. Organizations may also benefit from establishing clear environmental responsibilities and providing training on pollution prevention, resource efficiency, and relevant environmental management standards. Interpret the findings in light of the study's limitations, particularly its reliance on questionnaire responses from a single organization and a sample of 60 employees. Future research could examine additional industrial organizations, use larger samples, and combine questionnaire data with objective indicators of environmental performance. Such work would help clarify how leadership practices relate to environmental responsibility across different organizational settings.

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