



"The Role of Facebook in Raising Environmental Awareness to Achieve Sustainable Development – A Field Study on a Sample of Facebook Followers of the Ministry of Environment and Renewable Energies – Algeria"



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Abstract

Our study investigated Facebook's role in promoting environmental awareness for sustainable development. This was done through statistical processing of data obtained from a sample of followers of the Algerian Ministry of Environment's Facebook page. The Data was collected using an electronic questionnaire was processed using IBM SPSS Statistics.25 to answer our main research question. This question is related to understanding the role of the Facebook page of the Algerian Ministry of Environment and Renewable Energies in raising subscribers' awareness of their essential contribution to environmental protection to achieve sustainable development. Additionally, it explores their awareness of their environmental requirements and current and future problems, as well as their awareness of the roles they can play within the framework of sustainable environment. Our study concluded that the Facebook page of the Algerian Ministry of Environment and Renewable Energies plays a positive role in raising environmental awareness to achieve sustainable development.

Keywords

Facebook;
Environmental awareness;
Environmental culture;
Sustainable development.

الكلمات المفتاحية

فيس بوك؛
وعي بيئي؛
ثقافة بيئية؛
تنمية مستدامة.

دور فيس بوك في نشر الوعي البيئي لتحقيق التنمية المستدامة – دراسة ميدانية لعينة من مشتركي صفحة فيس بوك وزارة البيئة والطاقة المتجددة-الجزائر- ملخص

سعت دراستنا للتعرف على دور فيس بوك في نشر الوعي البيئي لتحقيق التنمية المستدامة، من خلال المعالجة الإحصائية للبيانات المتحصل عليها من عينة من مشتركي صفحة فيس بوك وزارة البيئة والطاقة المتجددة الجزائرية والتي تم جمعها باستخدام استمارة استبيان إلكتروني ومعالجتها وتحليلها باستخدام برنامج الحزمة الإحصائية (IBM SPSS Statistics.25) من أجل الإجابة على تساؤل دراستنا الرئيسي والذي بدوره مرتبط بالتعرف على دور صفحة فيس بوك وزارة البيئة والطاقة المتجددة الجزائرية في تحقق وعي المشتركين بحتمية مساهمتهم في حماية البيئة لتحقيق التنمية المستدامة وفي تحقق وعيهم بمتطلبات بيئتهم ومشاكلها الحالية والمستقبلية وكذلك في تحقق وعيهم بالأدوار التي يمكن أن يقدموها في إطار البيئة المستدامة. وقد توصلت دراستنا إلى أن صفحة فيس بوك وزارة البيئة والطاقة المتجددة الجزائرية تلعب دورا إيجابيا في نشر الوعي البيئي لتحقيق التنمية المستدامة.

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Doi:

I- Introduction :

The world of communication technology we live in is characterized by the widespread use of social media platforms. Statistics indicate that the number of users worldwide reached over five billion people in 2024, and it is expected to rise to more than six billion users by 2028 (Statista, 2024). This is due to the convenience these platforms provide in facilitating communication and interaction, transcending the boundaries of space and time. Facebook is considered the most important and widely used platform among them, with approximately 2.989 billion monthly active users in 2023 (Datareportal, 2023). Its ease of use and its broad digital space for exchanging information, experiences, and knowledge in various fields, as well as a platform for discussing issues of interest to individuals and groups that significantly impact their current situations and future, contribute to this popularity. Among these issues are those related to the environmental sector and sustainable development.

Today, the ecosystem is considered deteriorated, with numerous studies and reports sounding the alarm, confirming that the exacerbation of pollution problems, global warming, climate change, and others pose a real threat to human health and biodiversity loss. This has created significant challenges for countries that, through outlined developmental programs and plans, strive to balance benefiting from natural resources and ensuring their sustainability for future generations. Algeria, like other countries, is not immune to these problems and challenges. It ranked sixth in the Arab world in terms of pollution prevalence and twenty-third globally (Daal, 2020, p. 157). Additionally, the Ministry of Environment and Renewable Energies issued a report in 2000 describing the environmental situation in our country as concerning and deplorable (Bouzien, 2017, p. 68). This necessitates that decision-makers and environmental protection institutions work on finding the necessary solutions to control the situation and mitigate its exacerbation by promoting environmental awareness and achieving sustainable development. This can be done by leveraging the communication technology available through social media networks, particularly Facebook, as it is the most used platform in Algeria (KEMP, 2023) to educate community members about their environmental problems, challenges, and the roles they can play to reduce environmental damage and ensure the sustainability of natural resources.

Based on these premises, which revolve around leveraging the advantages of the digital space by institutions tasked with protecting the environment and ensuring the sustainability of its resources, to discuss and address environmental issues in our country and strive to develop a societal awareness that positively and effectively contributes to this field, our study aims to shed light on this by seeking an answer to the following main question: What is the role of the Facebook page of the Ministry of Environment and Renewable Energies in promoting environmental awareness to achieve sustainable development?

I.1 Hypotheses:

- There is a statistically significant relationship between the content published on the Facebook page of the Algerian Ministry of Environment and the awareness of subscribers about the necessity of their contribution to environmental protection to achieve sustainable development.
- There is a statistically significant relationship between the content published on the Facebook page of the Algerian Ministry of Environment and the awareness of subscribers about their environmental requirements and current and future problems.
- There is a statistically significant relationship between the content published on the Facebook page of the Algerian Ministry of Environment and the awareness of subscribers about the roles they can play within the framework of a sustainable environment.

I.2 Study Objectives:

Our study aims to achieve the following objectives:

- To identify the extent to which the Facebook platform, through the Ministry of Environment and Renewable Energies page, contributes to promoting environmental awareness in our society to achieve sustainable development goals.
- To identify the extent to which the Facebook page of the Ministry of Environment and Renewable Energies contributes to raising the community's awareness of their responsibilities towards their environment.
- To identify the extent to which the Facebook page of the Ministry of Environment and Renewable Energies contributes to raising awareness about environmental problems in Algeria and the challenges it faces now and in the future.
- To reveal the extent to which the Facebook page of the Ministry of Environment and Renewable Energies contributes to educating community members, whether individuals, groups, or institutions, about the roles they can play in protecting their environment and achieving sustainability.

1.3 Importance of the Study:

The importance of our study is highlighted in the following points:

- It sheds light on the environmental sector's problems in the country, which is experiencing increasing issues such as rising pollution levels, widespread waste, and difficulties in managing it, neglect of green spaces, depletion of natural resources, and more.
- It examines environmental awareness in our society, as it forms the cornerstone for any developmental efforts aimed at fostering a healthy and responsible environmental culture in the community.
- It discusses the importance of utilizing communication and information technology, particularly the Facebook platform, in promoting environmental awareness to curb irresponsible behaviors towards the environment and ensure the sustainability of its resources for future generations.
- The importance of our study lies in providing accurate and up-to-date statistics that assess the relationship between the roles played by the Facebook page of the Ministry of Environment and Renewable Energies and the awareness of its subscribers about various environmental sector issues, problems, and challenges.

1.4 Concept Definitions

Facebook: It is a social media platform that offers services aimed at enhancing communication and interaction among users. It is characterized by the ease and freedom of exchanging a wide variety of information and experiences, transcending geographical boundaries, saving time, effort, and costs. (Ben Amrouch, 2015, p. 89)

Environmental Awareness: Environmental awareness refers to the sufficient availability of environmental information and knowledge among community members - whether individuals, groups, or institutions - which enables them to understand their environmental problems and act appropriately to avoid causing harm. (Abdelmalek, 2008, pp. 152-153)

Environmental Culture: This is the combination of awareness, sensitivity, and positive and responsible behavior towards the environment. Having one of these elements alone does not mean that an individual or community is environmentally cultured. For instance, one might have extensive environmental knowledge but exhibit negative behavior towards the environment due to a lack of environmental sensitivity. Conversely, someone with positive feelings towards the environment might harm it due to insufficient environmental knowledge. Additionally, a person may have an appropriate level of awareness and sensitivity but not take initiatives to help solve environmental problems, such as encouraging neighbors to clean their neighborhood. (Dawaji, 2018-2019, p. 43)

Sustainable Development: Defined by the World Commission on Environment and Development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development implies limitations - not absolute limits - but constraints imposed by the current state of technology and social organization on environmental resources, and the capacity of the biosphere to absorb the effects of human activities." (World Commission on Environment and Development, 1989, p. 30)

1.5 Previous Studies

Algeria's efforts in developing plans aimed at addressing environmental issues and ensuring the sustainability of its natural resources require continuous scientific research. These studies address environmental issues and their current and future challenges to derive solutions that help decision-makers in formulating realistic, accurate, and organized developmental programs.

In this context, we selected a set of studies that discussed environmental awareness within its sustainable developmental framework and its relation to communication technology, specifically:

- **The First Study:** A study by Nada Boujaja titled "Social Media and its Role in Environmental Awareness and Achieving Sustainable Development - Facebook as a Model." This study aimed to identify the essence of environmental awareness and the means of embodying it within sustainable development, and to uncover the role of social media in achieving this, especially Facebook, and its contribution to guiding the environmental behavior of its users. The researcher employed a descriptive-analytical approach and an electronic questionnaire directed at a sample of 25 Ph.D. students in Library Science at the Library Science and Documentation Institute of Constantine 02, through their emails and Facebook pages. The questionnaire comprised two sections: the first concerned with the means and methods of environmental awareness and sustainable development, and the second dedicated to measuring Facebook's contribution to environmental awareness and achieving sustainable development. The researcher concluded that social media networks, particularly Facebook, are among the most important means of environmental awareness to achieve sustainable development due to their effective contribution to providing information on environmental preservation and disseminating topics on environmental education. (Boujaja, 2019)
- **The Second Study:** A study by "Khalaf and Kherchi" titled "The Role of Electronic Media in Promoting Environmental Awareness and Achieving Sustainable Development – Facebook as a Model." The researchers aimed to identify the methods and requirements for developing and promoting sustainable environmental awareness and to explore the characteristics and capabilities of Facebook that enable it to achieve its awareness-raising roles in

environmental protection for sustainable development. To achieve these objectives, the researchers addressed two sections: the first discussed the conceptual framework of environmental electronic media on Facebook and sustainable development, and the second discussed the effectiveness of Facebook in shaping and promoting environmental awareness and achieving sustainable development. They concluded that Facebook, being the most widely used and easiest social media platform, especially among university students, is a significant and effective type of electronic environmental media for raising awareness of environmental issues to achieve sustainable development goals. However, the ambiguity of environmental content published on Facebook pages resulted in weak interaction with those pages, and a significant proportion of Facebook users do not contribute to spreading environmental topics, preferring entertainment, sports, cooking, and social relationships instead, which indicates the presence of environmental awareness that does not translate into behavior towards the environment and its sustainability. (Khalaf and Kherchi, 2021)

- **The Third Study:** A study by Aisha Krikt titled "The Role of Social Media Networks in Environmental Education: Facebook as a Model." This field research was conducted on a sample of 41 followers of the Facebook page of the Environmental Protection and Sustainable Development Association in Jijel. The descriptive approach was used as the study methodology, and the questionnaire tool was used to collect data on the extent to which Facebook - as the most widely used social media application - serves environmental issues by raising environmental awareness and modifying behavior. The questionnaire included sections measuring Facebook usage habits and patterns, interaction with the Environmental Protection and Sustainable Development page, and the relationship between the page's content and environmental education. The study concluded that most of the sample members greatly prefer following pages active in the environmental field and actively interact with their posts. Additionally, the page is capable of raising environmental awareness and creating public opinion on its issues, highlighting its effective role in environmental education. (Krikt, 2019)

- Commentary on Previous Studies:

Our study benefited from the aforementioned previous studies in enriching it from theoretical, methodological, and empirical data interpretation perspectives, as well as in comparing results. These comparisons firstly lead to understanding the level and type of change achieved in the area of environmental awareness within our community and its utilization of the communication technology features represented by social media platforms, especially "Facebook." Secondly, the logical explanations provided by these comparisons help to fill gaps and remove any ambiguity related to issues of environmental awareness and the use of Facebook in promoting and enhancing it. In this regard, we mention several elements that were beneficial to our study:

- The previous studies' examination of most of our research variables, including environmental awareness, environmental culture, sustainable development, and Facebook, significantly contributed to understanding their essence and formulating definitions for them.
- They provided us with a significant set of references that enriched our study both theoretically and practically.
- They assisted us in constructing the questionnaire statements and obtaining objective interpretations of the collected data, specifically in explaining the relationship between the environmental content published on Facebook and the extent to which subscribers become aware of environmental and sustainable development issues.
- The results and recommendations of previous studies were among the most important elements that motivated us to address such a topic. They highlighted the important points to be addressed and focused on in our study. By confirming the effective role of Facebook in enhancing environmental awareness and illustrating the prevalence of negative and irresponsible behaviors towards the environment within our community, we as researchers were compelled to focus on addressing environmental development issues in relation to widely used social interaction platforms. The goal was to derive results that contribute to the optimal utilization of these platforms' features and benefits to modify behavior towards the environment in our country and achieve sustainability of its resources and wealth.

I.6: Theoretical Framework of the Study:

I.6.1: Requirements for Realizing Environmental Awareness:

The formation and enhancement of environmental awareness rely on several elements, including:

- Informing community members about their responsibilities towards their environment by providing them with the necessary information and knowledge that enables them to prevent causing harm (preventive awareness) and helps them address and resolve its issues (remedial awareness) (Khalaf & Kherchi, 2021, p. 901).
- Realizing that all community members (authorities, institutions, individuals) must unite in spreading awareness and working under the principle of "promoting good and preventing harm" to live in a clean and healthy environment.
- Involving community members in the development of environmental and sustainable development plans to ensure their participation in implementation.

- Providing them with sufficient and accurate information about the current and future state of their environment, including its issues, components, and current and future challenges.
- Creating an educational environment that promotes environmental education from an early age by supplying curricula with appropriate educational tools, starting with environmentally qualified teachers, books, documentaries, organizing workshops and student activities, programming field visits to nature reserves and environmental parks, and integrating sustainable environmental aspects into school architecture such as green spaces, using renewable energy, and proper waste segregation to aid recycling (Bourzama, 2017, pp. 115-116).
- Establishing laws and regulations that ensure the sustainability of natural resources, protect wildlife, and enforce judicial accountability for any actions that harm them.
- Activating the role of environmental media, both traditional and electronic, to extensively address environmental issues in a clear and simple manner and to inform about laws and developmental plans aimed at protecting the environment and ensuring its sustainability.

I.6.2: The Environmental Dimension in Relation to the Social and Economic Dimensions of Sustainable Development:

The dimensions of sustainable development are interrelated, as each dimension affects and is affected by the others. To achieve sustainable development, a balance and integration between its three dimensions must be established to serve its 17 goals identified by the United Nations in 2015 as part of the 2030 Sustainable Development Agenda, which include:

- Eradicating extreme poverty, achieving food security, ensuring good health and well-being, providing inclusive and equitable education, achieving gender equality, ensuring clean water and sanitation, affordable and clean energy, promoting economic growth and employment, building resilient infrastructure, promoting sustainable industrialization and innovation, reducing inequalities within and among countries, making cities and human settlements inclusive, safe, and sustainable, ensuring sustainable consumption and production patterns, combating climate change (United Nations, 2022, pp. 26-60), conserving marine resources, protecting terrestrial ecosystems and biodiversity, promoting justice and effective institutions, enhancing peaceful societies and institutions, and building effective global partnerships to achieve sustainable development goals (United Nations, 2017).

The sustainable development goals indicate that enhancing the ecosystem and ensuring resource sustainability can only be achieved through sustainability in the economic and social sectors. Issues in these sectors negatively impact environmental sustainability, as unhealthy agricultural practices harm biodiversity, and industrial waste and carbon emissions from major factories and oil burns lead to air, water, and soil pollution and climate change. The social sector can play a crucial role in addressing these issues by promoting social responsibility towards the environment and intensifying social initiatives and environmental awareness campaigns. Conversely, high levels of poverty, illiteracy, and poor health and educational services decrease environmental awareness and lead to harmful behaviors towards the environment. Studies have shown a positive relationship between the quality of the social sector and the environmental behavior prevalent in the community (Shuaib, 2012, p. 194). Therefore, achieving sustainable development in the environmental sector can only be accomplished through the integration of its various dimensions, ensuring the well-being of current and future generations.

I.6.3: The Contribution of Facebook in Spreading Environmental Awareness to Achieve Sustainable Development

To understand the roles that Facebook can play in spreading environmental awareness, it is first necessary to study its characteristics and identify the features that can be leveraged to achieve sustainable development goals in the environmental field.

- **Characteristics of Facebook:**

- **Widespread and Increasing Reach:** The number of Facebook users was 608 million in 2010, which increased to 2.797 billion in 2020 (Statista, 2024). In 2024, the number reached 3.049 billion users (Statista Research Department, 2024), making Facebook the leading social media platform in terms of user count.
- **Open Access to Knowledge:** Facebook has eliminated the monopoly of knowledge by institutions and educated elites. Now, anyone, regardless of their educational level, can access the information they need, allowing individuals to exercise their right to access information about the environmental issues in their country and globally.
- **Diverse Services:** Facebook provides a variety of services in various fields, including the environmental sector, allowing users to meet their needs, whether personal, psychological, or social.
- **Ease of Use:** The platform is easy to use, from creating pages to interacting, uploading, and sharing content, saving a lot of time, effort, and money.
- **High Interconnectivity:** Facebook can refer its users to various applications and websites such as official websites of personalities and institutions, YouTube, Instagram, etc., ensuring functional integration among them. This can be utilized in awareness campaigns that require the use of different communication tools to deliver messages to all segments and achieve informational focus and intensification (Boudjaja, 2019, p. 403).

- **Creating Interest Groups:** It allows for the creation of groups with common interests to exchange information and discuss ideas, providing excellent opportunities to use these groups to raise awareness about environmental issues and sustainable development.
- **Interactivity:** This feature allows role exchange between sender and receiver, leading to better message understanding and satisfaction.
- **Free Communication Space:** Unlike traditional media, Facebook enables credible individuals in their communities, with an enlightened understanding of events and issues, to play a role in spreading awareness and rallying public opinion. This can be exploited to understand environmental issues and defend them against irresponsible practices.
- **Contribution of Facebook to Spreading Sustainable Environmental Awareness:** Facebook can effectively contribute to developing and spreading environmental awareness within the framework of sustainable development if its characteristics and features are optimally employed. It can be used in the following ways:
 - **Official Institutions' Use:** Institutions and official bodies concerned with environmental issues can use their Facebook pages to inform about the state's developmental plans and laws regarding environmental protection and sustainable development. This ensures citizens exercise their right to know about their environment's status, its problems, potentials, and challenges, and their right to participate in measures taken regarding it, as stated in Article 3 of Law No. 03-10 related to environmental protection within sustainable development (Official Gazette of the People's Democratic Republic of Algeria, 2003, p. 5).
 - **Using Religious Discourse:** Employing religious discourse and slogans emphasizing the community's responsibility, institutions, and individuals, to protect and sustain the environment, and avoiding wasteful and extravagant consumption of resources (Boudjaja, 2019, p. 399).
 - **Mobilizing Citizens:** Opinion leaders and environmental organizations can mobilize citizens across the country to participate in volunteer campaigns, saving a lot of time and effort required to mobilize them.
 - **Individual Participation:** Anyone can participate in spreading environmental awareness on Facebook due to the ease of uploading and sharing photos and videos documenting their participation in environmental protection (Krikrit, 2019, p. 53).
 - **Intensive Awareness Campaigns:** Conducting intensive awareness campaigns and sharing successful environmental protection and sustainable development experiences from other countries to motivate community members to contribute with individual or collective initiatives or join national associations with environmental goals and assist in their project success.
 - **Educational Videos:** Posting videos that clearly and attractively explain the necessity of transitioning to clean energy and how to use it to prevent it from becoming a new source of pollution (Khelaf & Kherchi, 2021, p. 904).
 - **Learning from Major Environmental Organizations:** With the active participation of major global environmental protection associations on Facebook, which have over 3 million subscribers, national associations can leverage this success to learn from their experiences in spreading environmental awareness and sustainable development and how they utilize Facebook to achieve this. Some of the most prominent global organizations and associations active in this field on Facebook include Climate Action Network, IPCC, Greenpeace, IUCN, Environmental Defense Fund, United Nations Environmental, WWF, Rainforest Alliance, 350.org, and GEF (Google Search, 2024).

II– Methods and Materials:

II – 1. Study Method:

We adopted the descriptive statistical method, which is suitable for conducting an accurate and objective quantitative description of the role played by the Facebook page of the Ministry of Environment and Renewable Energies in spreading sustainable environmental awareness. This method also enables us to obtain logical analyses and interpretations of the relationship between the roles presented by the page and the subscribers' awareness of their roles towards their environment, the necessity of their contribution to its protection, and their awareness of their country's current and future environmental challenges.

II – 2. Study Population:

Our study population consists of the subscribers to the Facebook page of the Ministry of Environment and Renewable Energies - Algeria, which has 108,000 subscribers. The page was created in January 2019 to leverage the digital space in supporting the ministry's goals related to achieving sustainable development through the protection and promotion of the environmental sector.

II – 3. Study Sample:

- Given the difficulty of studying all units of the study population, a sample was taken using the simple random sampling method. The sample size was determined using the following formula:

$$S = \left[\frac{Z^2 \cdot xP(1-P)}{E^2} \right] / 1 + \left[\frac{((Z^2 \cdot xP(1-P)) / E^2) N}{1} \right]$$

Where:

- S, is the sample size
 - Z, represents the standard deviation value of 1.96
 - P, as a conservative estimate of expected results, was chosen to be 50%
 - E, represents the margin of error, estimated at 0.05
 - N, is the total number of the study population, 108,000 subscribers
- Upon applying the formula, we obtained a sample size of 400 individuals.

II – 4. Data Collection Tool:

We relied on an electronic questionnaire to collect data from the sample of subscribers to the Facebook page of the Ministry of Environment and Renewable Energies. The questionnaire includes four sections:

- 1.The first section is related to the personal data of the users of the Ministry of Environment and Renewable Energies' Facebook page.
- 2.The second section concerns data related to measuring the relationship between the content posted on the Facebook page of the Ministry of Environment and the subscribers' awareness of the necessity of their contribution to environmental protection to achieve sustainable development.
- 3.The third section measures the relationship between the content posted on the Facebook page of the Ministry of Environment and the subscribers' awareness of their environment's requirements and its current and future problems.
- 4.The fourth section measures the relationship between the content posted on the Facebook page of the Ministry of Environment and the subscribers' awareness of the roles they can play in achieving sustainable environmental goals.

We used the Statistical Package for the Social Sciences (IBM SPSS Statistics.25) to process the following elements:

- Measure the validity and reliability of the questionnaire using Cronbach's alpha coefficient.
- Conduct statistical processing of the collected data through frequencies and percentages, measures of central tendency (mean), and standard deviation.
- Identify the relationship between variables and test the validity of our hypotheses using one-way ANOVA, simple regression analysis, Pearson's correlation coefficient (R), coefficient of determination (R²), Student's T-test, and Fisher's F-test.

Reliability and Validity Testing of the Tool:

- **Reliability Testing of the Tool:** We used the Cronbach's alpha coefficient to measure the internal consistency and reliability of the questionnaire. If its value is greater than 0.80, it indicates that the measurement tool has excellent reliability (Abdel Rahman Idris, 2016, p.

$$\alpha = \frac{n}{n-1} \left(1 - \frac{\sum \text{var}^2 i}{\text{var}^2 i} \right)$$

By applying the formula, we obtained a reliability coefficient value of 0.949, indicating a high degree of internal consistency of our research questionnaire.

- **Validity Testing of the Tool:** We applied the self-validity test, which if its value ranges between (0.785-1.000), indicates that the questionnaire has a high degree of validity. It is calculated by taking the square root of the reliability coefficient (Bilella & Nasirbay, 2021, p. 328). $\text{Validity coefficient} = \sqrt{\alpha}$ The validity coefficient of our research questionnaire was estimated at 0.974, meaning it enjoys a high degree of validity. The table below shows the statistical analysis results for the reliability and validity testing of the study tool based on IBM SPSS results, confirming that our research questionnaire has a high degree of validity and reliability:

Validity Coefficient	Cronbach's Alpha	Number of Items	Questionnaire Section
0.923	0.852	06	Second Section
0.951	0.906	07	Third Section
0.919	0.845	08	Fourth Section
0.974	0.949	21	Overall Reliability and Validity Coefficient

III- Results and discussion :

III - 1 Analysis and Discussion of the Results of the First Section: Personal Data

Gender:

Gender	Frequency	Percentage (%)
Male	164	41%
Female	236	59%
Total	400	100%

Table 1: Distribution of the Sample According to Gender

Observing the table, we note that the number of female subscribers to the Facebook page of the Algerian Ministry of Environment and Renewable Energies is estimated at 236, accounting for 59%. In contrast, the number of male subscribers is 164, accounting for 41%. This indicates that females are more frequent users and followers of this page compared to males. The reason for female interest in environmental protection and sustainable development topics can be attributed to their sensory nature and emotional awareness. Females often show greater interest in relationships and caregiving, whether it involves caring for family members, society, or the environment. They are also characterized by strong emotional engagement with events and situations. A study conducted by researchers at AMEN clinics confirmed that the female brain is more active than the male brain regarding topics that stimulate their sensory-emotional side (Sayyid, 2017).

Women perceive the impact of environmental issues on their health, their family's health, and the future quality of their children's lives, which arouses their concerns about potential environmental problems and threats. This motivates them to seek reliable sources of information to follow environmental issues and sustainable development, especially those related to their country, with platforms like Facebook being the most commonly used by Algerians in their search for information – according to previous sources. Algerian women turn to these platforms and environmental protection institutions active through their pages, such as the Ministry of Environment and Renewable Energies, to access information that provides them with a sense of reassurance. This opportunity allows them to fulfill their natural role as caretakers of their families and environment, a finding supported by a survey of approximately 10,000 respondents from various countries, indicating that women are more responsive and cooperative towards environmental and sustainable development issues compared to men (Westendarp, 2021).

Age:

Age Range	Frequency	Percentage (%)
Less than 15 years	46	11.5%
15 to 25 years	50	12.5%
26 to 36 years	126	31.5%
37 to 47 years	130	32.5%
48 and above	48	12%
Total	400	100%

Table 2: Distribution of the Sample According to Age

From the table, we observe that the age groups ranging from 37 to 47 years old and from 26 to 36 years old are the most active followers of the Facebook page of the Algerian Ministry of Environment and Renewable Energies, with close percentages of 32.5% and 31.5%, respectively. The age group from 15 to 25 years old ranks third with 50 subscribers, accounting for 13.5%. The age groups of 48 years old and above, as well as those under 15 years old, occupy the last positions with consecutive percentages of 12% and 11.5%.

The reasons for the age groups from 37 to 47 years old and from 26 to 36 years old being the most engaged in following environmental and sustainable development issues on Facebook can be attributed to their belonging to the same generation known as Generation Y (Gen Y). This generation is characterized by widespread use of modern technology, high social awareness, and ease of engagement in multicultural interactive relationships. They are also known for advocating for their communities and even global issues (Lekgari Studio Team, 2024). These characteristics explain their responsiveness and interaction with current and future environmental issues, which have been highlighted recently in both traditional and modern media due to the deteriorating environmental conditions. Given Facebook's high connectivity and interactive features, Gen Y researchers find it an ideal platform to fulfill their responsibilities towards their environment by expressing their opinions, sharing ideas, and participating in environmental campaigns and joining active environmental protection associations.

As for the age group of 48 years old and above, despite their intellectual and emotional maturity, and their professional and social stability (Sabil Gateway, 2019), they are less likely to follow the Facebook page of the Algerian Ministry of Environment and Renewable Energies compared to the younger Generation Y. This is because this age group, known as Generation X (Gen X), is less active on Facebook or social media platforms in general, preferring traditional media such as television, newspapers, and radio to follow environmental and sustainable development issues. They also prefer personal interaction over digital interaction, such as direct engagement with family, neighbors, and participation in field

volunteering activities. Additionally, individuals over 47 years old prioritize balancing work and family time, which leads them to spend less time on social media platforms.

The age group from 15 to 25 years old and those under 15 years old belong to Generation Z (Gen Z), the generation following Millennials, characterized by their extensive use of communication technology and greater technical proficiency compared to other generations (Rawi, 2023). However, this study recorded that they are less likely to follow the Facebook page of the Algerian Ministry of Environment and Renewable Energies compared to the two age groups belonging to Generation Y. This can be explained according to a report by "We R Social" in 2023, stating that youth from Generation Z primarily use Facebook for entertainment and socializing with friends and family, which explains their lesser interest in Facebook pages focused on critical issues such as environmental security and sustainable development (Kabashi, 2023).

Educational Level:

Percentage	Frequency	Educational Level
8%	32	Lower than Average
32%	128	High School
60%	240	University
100%	400	Total

Table (3) shows the distribution of the sample by the educational level variable.

We can observe from the table that the majority of the subscribers to the Facebook page of the Algerian Ministry of Environment and Renewable Energies have a "University" educational level with a frequency of 240 subscribers, representing 60%, followed by those with a "High School" educational level with a frequency of 128 subscribers, representing 32%. Those with an educational level of "Lower than Average" ranked last with a frequency of 32 subscribers, representing 8%.

These results are consistent with the findings of the study by "Andre Kirbiš" which confirmed that the higher the individual's educational level, the higher their interest and awareness of environmental and sustainable development issues (Kirbiš, 2023, p. 9). This is evident in the fact that university graduates subscribe to the ministry's Facebook page more than other educational levels, embodying the role of university education in preparing generations with critical thinking skills and a desire to seek information and join interactive groups to discuss their community's problems in all fields and exchange ideas on issues that affect its growth and resource sustainability (oktamam, 2022).

Given that environmental issues and sustainable development are among the most talked-about topics on social media in recent times - due to the deterioration of the environment in the world and Algeria in particular, which has affected the productivity and quality of other sectors - this has led university students and graduates to turn to the Facebook page of the Ministry of Environment and Renewable Energies to follow the news and developments of the environmental situation in their country, as it is the first official institution in the country concerned with environmental and sustainable development issues. It is therefore the first source of official and reliable news and information that reveals the changes and developments taking place in this field.

The reasons for the lower subscription rates of those with other educational levels compared to the first group are due to their weaker interest in environmental and sustainable development issues compared to those with university education. One of the reasons for this is the weak role played by "primary, middle and secondary" educational institutions in the field of environmental education and sustainable development. A study by (Samia Bouafia) confirmed that "the educational curricula in Algeria in general that deal with the environmental field - such as Islamic education, geography and civic education - contain environmental concepts related to the components of the environment, its resources, phenomena and problems. However, these concepts are general and lack sub-concepts, in addition to being treated in a superficial and traditional way" (Bouafia, 2018, p. 254).

A study by (Fetiha Tawil) also confirmed that "the knowledge level of middle school students in the fields of sustainable development, and more specifically their knowledge of the environmental field, is medium to low. This lack of information and knowledge is evident in the geography and civic education textbooks, which focus more on the social than the natural aspect, as well as the modest performance of environmental education teachers and the focus on the traditional theoretical aspect without the practical aspect" (Tawil, 2012, pp. 390-394).

Occupational Field:

Percentage	Frequency	Occupational Field
28%	112	In the Environmental Field
72%	288	Outside the Environmental Field
100%	400	Total

Table (4) shows the distribution of the sample by the occupational field variable.

It is clear from the table that the majority of the subscribers to the Facebook page of the Algerian Ministry of Environment and Renewable Energies work outside the environmental field with 288 subscribers, representing 72%, while the proportion of those working in the environmental field is 28% with a frequency of 112 subscribers. This is considered a positive indicator of the interest of community members in environmental issues regardless of the nature of their work.

The reasons for this interest can be attributed to many factors, including:

A sense of responsibility towards their community and the future of their next generations. This has created a motivation for them to participate in environmental protection by subscribing to Facebook pages that are active in this field, such as the Facebook page of the Ministry of Environment and Renewable Energies. These pages provide them with an opportunity to interact with those working in the environmental field (while those working in the field do not need this as much because they communicate with each other on a daily basis due to their work in the field).

Environmental awareness campaigns have extended environmental awareness to all segments of society, including those who do not work directly in this field.

On the other hand, the low Facebook participation of those working in the environmental field can be attributed to the fact that their number may be relatively small compared to those working in other fields. Therefore, it is natural that the number of subscribers from outside the environmental field is larger. In addition, they may be busy with their daily work and may rely on sources other than Facebook pages to obtain environmental information.

III - 2 Analysis and Discussion of the Second Axis Results: Measuring the Relationship Between Content Published on the Algerian Ministry of Environment's Facebook Page and Subscribers' Awareness of Their Contribution Necessity in Environmental Protection for Sustainable Development.

Statement Number	Statement	Standard Deviation	Weighted Average	Frequency
1	The ministry's Facebook page publishes legal texts related to explaining the community's responsibility towards their environment.	0.792	1.57	Never
2	The page presents religious posts obliging community members to protect their environment.	0.778	1.66	Never
3	The page publishes topics demonstrating the negative impact of citizens' negative behaviors towards their health.	0.875	2.36	Always
4	The page publishes topics demonstrating the negative behaviors' impact on the biodiversity sustainability in the country.	0.557	2.35	Always
5	The page publishes topics demonstrating the negative behaviors' impact on the sustainability of natural resources.	0.590	2.39	Always
6	The page publishes topics demonstrating the negative environmental behaviors' impact on the economic and social sectors' decline.	0.599	2.39	Always
	Overall Mean and Standard Deviation for the Axis	0.698	2.098	Sometimes

Table (5): Illustrates the Sample's Responses to Statements Regarding the Role of the Algerian Ministry of Environment's Facebook Page in Raising Awareness about the Necessity of their Contribution to Environmental Protection for Sustainable Development.

We notice from the table that the overall mean score for the relationship between the content published on the Algerian Ministry of Environment's Facebook page and subscribers' awareness of the necessity of their contribution to environmental protection for sustainable development is approximately 2.089, which falls between "Always" and "Never". The overall standard deviation was about 0.698, indicating that respondents' evaluations of the page on this axis are moderately evenly distributed.

Below are the results for each statement of the axis:

Statement 1: The mean score was around 1.75, indicating that the ministry's Facebook page never publishes legal texts that clarify community responsibility towards their environment. The standard deviation was about 0.59, suggesting moderate variability in respondents' answers.

Statement 2: The mean score was approximately 1.66, indicating that the page never presents religious posts obliging community members to protect their environment. The standard deviation was about 0.77, indicating varied responses among respondents.

Statement 3: The mean score was 2.36, indicating that the page always publishes topics demonstrating the negative environmental impact of citizens' behaviors on their health. The standard deviation was 0.87, indicating diverse responses among respondents.

Statement 4: The mean score was 2.35, indicating that the page always publishes topics demonstrating the negative impact of community members' behaviors on the biodiversity sustainability in the country. The standard deviation was about 0.55, suggesting responses were more consistent.

Statement 5: The mean score was 2.39, indicating that the page always publishes topics demonstrating the negative impact of community behaviors on the sustainability of natural resources. The standard deviation was about 0.59, indicating responses were consistent.

Statement 6: The mean score was 2.39, indicating that the page always publishes topics demonstrating the negative environmental impact of community behaviors on the economic and social sectors' deterioration. The standard deviation was about 0.59, indicating consistent responses.

Statistical analysis of these statements generally shows evaluations ranging from average to positive. Legal texts and religious posts received negative evaluations, indicating that subscribers affirm that the page does not focus on these issues, despite their potential significant contribution to community awareness of the necessity of their participation in environmental protection. These topics, if presented consistently and repeatedly, could contribute to guiding the community towards discipline and compliance, thus achieving progress and civilization. Our religion's teachings emphasize the obligation of cleanliness, environmental preservation, kindness to animals, and promoting good conduct, aiming to live in a healthy and beautiful environment, encouraging adherence to divine principles that affirm, "Allah is beautiful and loves beauty." Legislation focusing on sustainable environmental protection reinforces the necessity for community members to adhere to these ethical principles, as stipulated by Algerian legislation since the establishment of the National Council for Environmental Protection in 1972, up to the enactment of laws for sustainable development programs in the environmental sector (Jabari, 2021-2020). Specific legislation includes penalties for damaging biodiversity, protected areas, and air, water, and land environments, alongside penalties for facilities exploiting without respecting environmental protection standards.

Publications addressing the negative impact of citizens' behaviors on their health, biodiversity sustainability, and natural resources received positive evaluations, indicating the page's focus on sustainable environmental education. Posts cover: Explaining the impact of plastic waste and industrial pollution on air and water quality, increasing respiratory diseases, skin diseases, cancer risks, and healthcare costs for citizens with low incomes and national healthcare expenses in terms of high chronic treatment costs.

Highlighting how improper waste disposal pollutes the environment and spreads insect and rodent-borne diseases.

Illustrating how deforestation and green space destruction contribute to air quality deterioration and temperature rise, negatively affecting citizen health.

Shedding light on the unregulated fishing's impact on marine and terrestrial species sustainability, threatening ecological balance and reducing biodiversity.

Explaining the industrial and agricultural pollution's impact on various ecosystems, leading to the extinction of numerous wildlife species.

Describing how beach and natural area pollution affects tourism attractiveness, thereby impacting the local economy and, consequently, the social sector. Algeria aims to reduce dependence on fossil fuel revenue by focusing efforts on developing the tourism sector.

This indicates that the Ministry of Environment and Renewable Energies fully understands the importance of raising community awareness of their behaviors' impact on the current and future environmental systems, affecting various other sectors. This finding aligns with the study by Aisha Kriket, affirming that 87.80% of the Environmental and Sustainable Development Association's Facebook page subscribers in Jijel believe the page has increased their awareness of environmental issues through posts explaining the impact of their behaviors on health and causing economic and financial losses (Kriket, 2019, p. 58). Meanwhile, a study by Nada Bujaja among doctoral students in library science at Constantine 02 (study sample) confirmed that while Facebook effectively educates them about their behaviors' impact on their environment and sustainable development, it moderately contributes to changing their behaviors (Bujaja, 2019, p. 410).

To accurately understand the relationship between the content published on the Algerian Ministry of Environment's Facebook page and subscribers' awareness of their necessity to contribute to environmental protection for sustainable development, we relied on a range of statistical significance tests and regression analysis to verify the hypothesis variables' accuracy.

Source	R	R ²	Significance Level	F Value	Mean Squares	Sum of Squares
Regression	0.963	0.927	0.000*	5074.503	3509.394	3509.394
Error	0.692	275.246			3784.640	
Total					7294.034	

Table (6): One-way ANOVA to test the first hypothesis

** Significant at a significance level ($\alpha \leq 0.05$) *

It is clear from the data in the table above that the value of (F) (5074.503) is statistically significant at a significance level of less than (0.05) and that the independent variable (the content published on the ministry's Facebook page) explains

92.7% of the variance in the dependent variable (the subscribers' awareness of the inevitability of their contribution to environmental protection in order to achieve sustainable development). This is a relatively high explanatory power. The correlation coefficient, which came with a value of (0.963) or 96.3%, indicates that there is a strong positive correlation between the two variables.

The results of the simple regression analysis are shown in the following table:

Model	Constant	β	Standard Error	Beta	Significance Level (T)	T Value
Content published (X)	*0.000	0.346	0.186	0.944-	0.004	0.288

Table (7): Results of simple regression analysis

The simple regression model equation, $Y=0.288+0.175X$, where X is the independent variable (published content) and Y is the dependent variable (awareness of the necessity to contribute), indicates that an increase of one unit in the independent variable results in an increase in the dependent variable by 0.288. The standardized coefficient (0.936) demonstrates that the strength of the relationship between the variables is 93.6%. Regarding the significance tests of the regression coefficients, the TTT-value (71.236) for the independent variable shows statistical significance at a level less than 0.05.

Based on the above, there is a statistically significant relationship between the content published on the Ministry of Environment's Facebook page and subscribers' awareness of the necessity to contribute to environmental protection for sustainable development. Thus, the first hypothesis is supported. This finding aligns with the study by "Aicha Krikat," which reported that 80.48% of subscribers to the Environmental and Sustainable Development Association's Facebook page in Jijel confirmed that the published media content effectively motivated them to contribute to environmental protection and development, particularly through repeated dissemination methods (Krikat, 2019, p. 56).

III - 3 Analysis and Discussion of the Results of Axis III: Measuring the Relationship between the Content Published on the Facebook Page of the Algerian Ministry of Environment and the Achievement of Subscribers' Awareness of the Requirements of Their Environment and Its Current and Future Problems

Statement Number	Statement	Weighted Average	Standard Deviation	Frequency
7	The page publishes topics about environmental problems in Algeria	2.35	0.6230	Always
8	The page publishes topics about the environmental potential available in Algeria	2.36	0.6090	Always
9	The page publishes topics about environmentally harmful behaviors	2.39	0.5990	Always
10	The page publishes topics on how to conserve natural resources in a way that ensures the benefit of future generations.	2.39	0.5990	Always
11	The page publishes statistics and reports on the state of the environmental sector in Algeria	1.73	0.8110	Sometimes
12	The page presents topics explaining the development plans drafted by the state to improve the environmental situation	2.39	0.5990	Always
13	The page launches awareness campaigns in partnership with national and international institutions and associations	2.39	0.5990	Always
	Overall mean and standard deviation of the axis	2.285	0.634	Sometimes

Table (8): Shows the sample's responses to the statements related to the role of the ministry's Facebook page in achieving their awareness of the requirements of their environment and its current and future problems.

We can observe from the table that the overall mean score for the axis was around 2.285, which is between "Sometimes" and "Always". This means that the subscribers' evaluations of this axis are generally positive. The standard deviation was around 0.634, which means that the subscribers' evaluations of the page in relation to this axis are distributed homogeneously.

The following is a review of the results of each statement of the axis:

Statement 7: The mean score for the statement was around 2.35, which indicates that the page always publishes topics about environmental problems in Algeria. The standard deviation was around 0.62, which means that the individuals' responses were somewhat in one direction, as the degree of dispersion of the responses was moderate.

Statement 8: The mean score for the statement was around 2.36, which indicates that the page always publishes topics about the environmental potential available in Algeria. The standard deviation was around 0.609, which means that the individuals' responses were somewhat in one direction, which reduces the degree of dispersion of the responses.

Statement 9: The mean score for the statement was around 2.39, which indicates that the page always publishes topics about environmentally harmful behaviors. The standard deviation was around 0.59, which means that the individuals' responses were somewhat in one direction, as the degree of dispersion of the responses was moderate.

Statement 10: The mean score for the statement was around 2.39, which indicates that the page always publishes topics on how to conserve natural resources in a way that ensures the benefit of future generations. The standard deviation was around 0.59, which means that the individuals' responses were in one direction, as the degree of dispersion of the responses was somewhat low.

Statement 11: The mean score for the statement was around 1.73, which indicates that the page sometimes publishes statistics and reports on the state of the environmental sector in Algeria. The standard deviation was around 0.84, which means that the individuals' responses were not somewhat in one direction, which increases the degree of dispersion of the responses.

Statement 12: The mean score for the statement was around 2.39, which indicates that the page always presents topics explaining the development plans drafted by the state to improve the environmental situation. The standard deviation was around 0.59, which means that the individuals' responses were somewhat in one direction, as the degree of dispersion of the responses was moderate.

Statement 13: The mean score for the statement was around 2.39, which indicates that the page always launches awareness campaigns in partnership with national and international institutions and associations. The standard deviation was around 0.59, which means that the individuals' responses were somewhat in one direction, as the degree of dispersion of the responses was somewhat low.

- The statistical analyses of the statements of this axis show in general a positive evaluation of the subscribers about the role of the page in enhancing their awareness of the requirements of their environment and its current and future problems with a moderate level of dispersion. The roles played by the page in this framework effectively are represented in the following elements:

- **Its effective contribution to increasing subscribers' awareness of environmental problems by presenting them with issues of:** pollution in all its forms, waste management, desertification and climate change, deforestation... In this regard, the study "Aicha Cricket" concluded that there is a group of environmental topics and issues that are presented on the Facebook page of the Environmental and Sustainable Development Association - Jijel - which receive positive attention and interaction from subscribers, such as: pollution, water scarcity, recycling waste, management of green spaces. As for the study "Khallaf and Kharchi", it confirmed that the most common environmental issues raised on the Facebook platform are those that have a direct relationship and impact on the health of citizens, such as raising awareness of the harmful effects of the spread of waste, water pollution and everything related to the COVID-19 pandemic.

- Promoting subscribers' awareness of the potential available in the country in the environmental field and explaining the development plans drafted by the state to improve the environmental situation.

The page always displays informative publications about the natural resources and biodiversity that Algeria abounds in, such as publications about lakes and seafronts, publications about forests and nature reserves... It also continuously displays and explains the development plans and projects launched by the Ministry of Environment and Renewable Energies in cooperation with national or international institutions, such as the development plans that present Algeria's approach to adopting a policy of relying on digitization to innovate smart systems in the field of clean energy in order to reduce greenhouse gas emissions, and publications on the green economy such as introducing the Green Dam project to preserve the environment and combat desertification, where it uses the slogan "The Green Dam: Repairing the land, protecting the environment, and ensuring food security", and others on development plans in the field of the circular economy for waste management, in addition to displaying and explaining development projects aimed at reducing climate change phenomena.

- Enhancing subscribers' awareness of environmentally harmful behaviors and explaining how to conserve natural resources in a way that ensures the benefit of future generations.

In this context, the page regularly displays awareness-raising publications, such as those that explain the various negative behaviors that harm forests and the terrestrial and marine ecological balance. It also uses, on a permanent basis, awareness-raising campaigns in partnership with national and international institutions and associations, such as launching afforestation campaigns in burnt forests, launching national awareness-raising campaigns during the month of Ramadan to combat food waste and spread the culture of rational consumption, which was carried out with the participation of the

Algerian Islamic Scouts, the Supreme Council of Youth, and the National Observatory of Civil Society, launching national campaigns to clean beaches and forests, and inviting primarily environmental clubs for elementary school pupils and summer camp children to work on strengthening environmental education. In this context, the study "Khallaf and Kharchi" confirmed that the Facebook platform contains awareness-raising campaigns in the field of sustainable environment in an intensive way, and their content often revolves around raising awareness of the irresponsible actions of community members towards the environment, especially with regard to littering and wastefulness in energy and natural resource consumption. The study also concluded that the most interactive awareness campaigns are those that use elites and opinion leaders to present environmental content, such as doctors, experts, athletes, and media professionals.

- The evaluation of subscribers to the page of the Ministry of Environment and Renewable Energies of Algeria of the awareness-raising publications related to the dissemination of statistics and reports on the state of the environmental sector in Algeria was an "average" evaluation, as subscribers confirmed that they are exposed to such topics, but not on a permanent basis, despite the fact that the process of displaying these statistics and reports, whether national or international, and using reliable sources on a permanent and repeated basis and using a clear and simple style enhances the awareness of community members of the extent of the problems facing the environmental sector in their country. With the availability of the sharing feature, these publications can reach the largest possible number of users of the digital space, and thus contribute to spreading environmental awareness within its sustainable development framework.

To accurately understand the relationship between the content published on the Algerian Ministry of Environment's Facebook page and subscribers' awareness of their current and future environmental requirements and issues, we relied on a series of statistical significance tests and regression analysis to confirm the validity of the second hypothesis:

Source	Sum of Squares	Mean Squares	F Value	Significance Level	R Correlation Coefficient	R ² Determination Coefficient
Regression	4630.136	4630.136	3888.865	0.000*	0.952	0.907
Residual	473.864	1.191				
Total	5104.000					

Table (9): ANOVA Table (Table): Analysis of Variance

Statistically significant at the significance level ($\alpha \leq 0.05$)

The data in the table above shows that the F value of 3888.865 is statistically significant at a significance level of less than 0.05. The independent variable (published page content) explains 90.7% of the variance in the dependent variable (subscribers' awareness of environmental requirements and current and future issues), which is a relatively high explanatory power. The correlation coefficient (0.952) indicates a strong positive correlation of 95.2% between the two variables.

Here's a breakdown of the simple regression analysis results:

Variable	Coefficient (β)	Standard Error	t-value	Significance Level (p-value)
Constant	0.331	0.005	62.361	0.000
Page Content (X)	1.188	0.244	4.874	0.000

Table 10: Results of Simple Regression Analysis

Statistically significant at the level ($\alpha \leq 0.05$)

As shown in the table above, the estimated linear regression equation is as follows:

$$Y = 0.331 + 1.188X$$

Standard error of coefficients (0.005) (0.244)

X is the independent variable (published page content); **Y** is the dependent variable (subscribers' awareness of environmental requirements and current and future issues).

Thus, the simple regression model equation indicates that a one-unit increase in the independent variable has an effect of increasing the dependent variable by (0.331), or 33.1%, as evidenced by the standardized coefficient (0.952). The strength of the relationship between the content posted on the Facebook page of the Algerian Ministry of Environment and the subscribers' awareness of their environmental requirements and current and future issues was found to be (95.2%).

As for the significance tests of the regression coefficients, it is clear from the previous table that the calculated T-value (62.361) for the independent variable is statistically significant at a significance level of less than (0.05).

Based on the foregoing, there is a statistically significant relationship between the content posted on the Facebook page of the Algerian Ministry of Environment and the subscribers' awareness of their environmental requirements and current and future issues. Thus, the second hypothesis is confirmed. This is a result consistent with the findings of both:

- The study by "Nada Boujajja", which confirmed that the majority of the respondents from doctoral students in library science in Constantine 02 consider Facebook to be an important platform in shaping their awareness of how to face their environmental problems by developing their knowledge and skills in this field.
- The study by "Aisha Kriket", which concluded that the Facebook page of the Environment and Sustainable Development Association - Jijel - effectively contributes to raising subscribers' awareness of environmental issues by introducing them to these problems and providing solutions that explain how to address them. It focuses on showing the negative and positive behaviors of citizens towards their environment.

III - 3 Analysis and Discussion of the Results of Axis IV: Measuring the Relationship between the Content Published on the Facebook Page of the Algerian Ministry of Environment and the Achievement of Subscribers' Awareness of the Roles They Can Play in the Framework of Sustainable Environment

Statement Number	Statement	Standard Deviation	Weighted Average	General Trend
14	The page encourages the community to participate and engage in environmental protection associations	0.6040	2.34	Always
15	The page encourages community members to economize on energy consumption	0.6040	2.34	Always
16	The page publishes initiatives by individuals and groups that have contributed to solving environmental problems and the sustainability of their resources	0.8370	1.8	Sometimes
17	The page displays publications honoring community members who have contributed with their innovations and initiatives to solve environmental problems	0.9030	1.92	Sometimes
18	The page launches challenges and competitions to encourage environmental protection	0.8360	2.04	Sometimes
19	The page encourages community members to move towards replacing non-renewable energies with clean energies	0.6170	2.40	Always
20	The page launches virtual seminars and workshops using live streaming to interact with subscribers and answer their concerns about the environmental sector and sustainable development	0.8090	1.63	Never
21	The page encourages community members to report any behaviors that threaten their environment	0.7550	1.52	Never
	Total mean and standard deviation of the axis	0,745	1.998	Sometimes

Table 11: Shows the responses of the sample to the statements related to the role of the Ministry's Facebook page in achieving their awareness of the roles they can play in the framework of sustainable environment

As observed from the table, the overall mean score for Axis IV was around 1.998, which falls between "Sometimes" and "Never". This indicates that the respondents' answers were not entirely consistent. The standard deviation was around 0.745, suggesting a moderate level of dispersion of responses.

Individual Statement Analysis

Statement 14: The mean score for this statement was around 2.34, indicating that respondents generally believe that the page "Always" encourages community participation in environmental protection activities. The standard deviation of 0.604 suggests that respondents' answers were somewhat consistent, with a moderate level of dispersion.

Statement 15: The mean score for this statement was around 2.34, similar to Statement 14. This implies that respondents also believe the page "Always" encourages community members to economize on energy consumption. The standard deviation of 0.604, again similar to Statement 14, suggests that respondents' answers were somewhat consistent, with a moderate level of dispersion.

Statement 16: The mean score for this statement was around 1.8, indicating that respondents believe the page "Sometimes" publishes initiatives by individuals and groups that have contributed to environmental protection. The standard deviation of 0.83 suggests that respondents' answers were not entirely consistent, with a higher level of dispersion.

Statement 17: The mean score for this statement was around 1.92, similar to Statement 16. This implies that respondents also believe the page "Sometimes" showcases community members who have made a difference through their innovations and initiatives for environmental protection. The standard deviation of 0.903, slightly higher than Statement 16, suggests that respondents' answers were not entirely consistent, with a higher level of dispersion.

Statement 18: The mean score for this statement was around 2.04, indicating that respondents believe the page "Sometimes" launches challenges and competitions to promote environmental protection. The standard deviation of 0.836 suggests that respondents' answers were not entirely consistent, with a higher level of dispersion.

Statement 19: The mean score for this statement was around 2.4, indicating that respondents generally believe the page "Always" encourages community members to transition from non-renewable to clean energy sources. The standard deviation of 0.617 suggests that respondents' answers were somewhat consistent, with a moderate level of dispersion.

Statement 20: The mean score for this statement was around 1.63, indicating that respondents believe the page "Sometimes" organizes virtual seminars and workshops using live streaming to engage subscribers and address their concerns about environmental issues. The standard deviation of 0.809 suggests that respondents' answers were not entirely consistent, with a higher level of dispersion.

Analysis of Statement 21

The mean score for Statement 21 was around 1.52, indicating that respondents believe the page "Sometimes" encourages community members to report environmentally harmful behaviors. The standard deviation of 0.755 suggests that respondents' answers were not entirely consistent, with a higher level of dispersion.

Overall Evaluation of Axis IV Statements

The statistical analyses of the statements in this axis generally reveal a moderate to low evaluation of the page's role in promoting subscribers' awareness of the roles they can play in the framework of sustainable environment. This reflects a diversity of opinions among the respondents regarding the page's effectiveness in this area.

Effective Performance of the Page

- **Encourages community members to participate in environmental protection associations on a permanent basis.**

This demonstrates the Ministry's awareness of the importance of involving civil society institutions in the advancement of the environmental sector and achieving the sustainability of its natural resources. The page's posts include a link to the digital platform of national associations working in this field so that citizens have a wider range of associations to choose from and learn about their field activities. Posts about the Algerian Islamic Scouts are the most frequently posted on the Ministry's page, reflecting the Ministry's awareness that environmental awareness starts from a young age.

In the context of environmental protection associations, the study by "Nada Boujaja" found that 80% of doctoral students in library science at Constantine University follow Facebook pages of associations concerned with environmental issues. The Facebook page of the Environmental and Sustainable Development Association in Ras El Jabal and the Facebook page of the Beautiful View Association for Environmental Protection and Sustainable Development are among the most followed pages among the respondents. However, the results of the study by "Khilaf and Kherchi" concluded that the number of Facebook users engaged in the Facebook pages of environmental protection associations is "weak" and attributed this reluctance to several factors, including: the lack of encouragement from the media - both traditional and electronic - for community members to join these associations; the environmental information published on the Facebook pages of these associations is obscure and complex; and the lack of public trust in associations in general, whether those active in the environmental field or outside it, due to the spread of news of corruption cases and the use of their activities as a cover to gain material or power gains, which contributed to the weakness of community participation and support for these associations.

- **Continuously encourages community members to economize on energy consumption and to move towards replacing non-renewable energies with clean energies.** The page regularly publishes posts explaining the strategy adopted by Algeria in its quest for energy transition and gradual exit from dependence on hydrocarbons. Other posts explain that the country is suffering from a shortage of fossil fuels, a significant increase in energy consumption, and increasing population growth. The page also emphasizes that the country's food security is linked to the availability of energy. Its posts are diverse in terms of the target audience, with posts addressed to citizens in general, farmers, and industrialists, calling on them to participate in rational energy consumption and to move towards using solar energy, given that the country is rich in it. The page uses a number of slogans in this regard, including: "Our land is our future", "Participate in the plan", "Water for peace", "Together to combat plastic pollution". The study by "Khilaf and Kherchi" indicated that among the environmental topics that attract a large number of Facebook users are topics related to clean renewable energies and their uses, as the university youth group is the largest group using Facebook and is therefore attracted to and prefers topics related to new technological developments and scientific innovations.

Moderate Performance of the Page

- **The page contributes moderately to raising awareness through posts about initiatives by individuals and groups who have contributed to solving environmental problems and the sustainability of their resources.** Most of the posts in this regard relate to start-ups working in the field of waste recycling, as well as showcasing initiatives by young people who have participated in sustainable solutions, particularly those related to solar energy applications and smart solutions. Displaying these initiatives is essential to raise awareness about the various ideas and areas in which citizens can contribute to the development and sustainability of their environment.

Regarding the results of previous studies on raising environmental awareness using Facebook posts of community initiatives, the study by "Aicha Krikta" confirmed that the Facebook page of the Jijel Environmental and Sustainable Development Association focuses 77.8% on presenting volunteer efforts in the field of environmental protection and is considered one of the most interactive topics among users, enjoying a high participation rate estimated at 80%.

Analysis of Moderate and Weak Performance of the Page

Moderate Performance

- **The page moderately contributes to displaying posts honoring community members who have contributed their innovations and initiatives to solving environmental problems.** We find posts specifically about: honoring projects of start-ups working in the field of recycling metal waste, which were able to export their products abroad; honoring associations and clubs involved in environmental activities; honoring the winners of national competitions concerned with environmental protection and sustainable development. Although posts honoring community initiatives generate active interaction and high participation from page subscribers, which can significantly contribute to highlighting environmental issues and the country's development challenges and needs in this area, these topics do not receive a wide space for publication on the page.
- **The page moderately contributes to displaying posts related to competitions and challenges launched to encourage society in all its categories to protect the environment within its sustainable framework.** Most of these competitions are organized by the Algerian Ministry of Environment and Renewable Energies in cooperation with various national sectors and institutions, in order to achieve synergy of efforts to promote environmental education and reach a healthy and responsible environmental culture in society. Among these competitions published on the Ministry's page are: the environmental competition in written press organized by the Djurdjura National Park; the "Scratch for Green Impact" competition aimed at the age group between 10 and 16 years old and related to electronic innovations that contribute to reducing energy waste; the national competition for environmental education under the slogan "Our Environment is Our Future", which witnessed the participation of people with special needs.

Weak Performance

- **The page does not use virtual seminars and workshops with live streaming to interact with subscribers and answer their concerns about the environmental sector and sustainable development.** These techniques can significantly contribute to the field of raising environmental awareness by: providing modern and comprehensive information on environmental issues and sustainable development; thanks to the possibility of sharing the live broadcast link, it is possible to reach the largest number of community members active on the Facebook platform; saving time, effort, and material costs for both organizers and participants; facilitating immediate interaction between subscribers and experts, which allows them to ask questions and get direct answers. In contrast, the page publishes summaries of the proceedings of seminars and workshops that it has carried out in the field, such as workshops aimed at young people that contain awareness and educational activities such as drawing workshops, workshops on identifying biological elements under the microscope, artistic recycling workshops, tree planting, diving, environmental games... As for field forums and meetings, their summaries are displayed in the form of a short text that identifies the participants and their purpose, and are only accompanied by pictures without videos illustrating their proceedings to benefit from the interaction that took place during them, or attaching those posts to a link that directs subscribers to the page to those meetings and forums to participate and interact with their members.
- **The page does not educate community members about the necessity and importance of their participation in protecting the environment by reporting any behaviors that threaten it and threaten the sustainability of its natural resources, and that the efforts of the state and the responsible authorities to monitor and protect the environment need their efforts to live in a healthy and safe environment for them and for future generations.** The page is also devoid of any mention of any bodies or institutions that can be contacted in case of noticing any such behavior. While the Algerian legislator has provided for penalties for any natural or legal person who causes harm to the environment, we find article 3 of law No. 03-10 on the protection of the environment within the framework of sustainable development, dated July 19, 2003, stipulates the "polluter pays" principle: "Whereby any person whose activity causes or may cause damage to the environment shall bear the costs of all measures to prevent and reduce pollution and restore places and their environment to their original state." (Official Gazette of the People's Democratic Republic of Algeria, 2003). The penalties enacted by the Algerian legislator and related to environmental crimes range from imprisonment that can reach 5 years to a fine that may reach ten million Algerian dinars (10,000,000 DA) or one of these two penalties, depending on the nature and extent of the damage caused to the environment and the framework in which it was classified (offense, misdemeanor, felony).

Statistical Analysis

To accurately identify the relationship between the content published on the Facebook page of the Algerian Ministry of Environment and the achievement of subscribers' awareness of the roles they can play within the framework of sustainable environment, we relied on a set of statistical tests as well as a regression analysis test to understand the relationship between the variables of the third hypothesis and to verify its validity:

Source	R	R ²	Significance Level	F Value	Mean Squares	Sum of Squares
Regression	0.935	0.875	0.000*	2787.412	6100.851	6100.851
Error	-	-	-	2.189	871.109	-
Total	-	-	-	-	6971.960	-

ANOVA Table No. (12): Analysis of Variance for Hypothesis Testing (Second Hypothesis)

Statistically significant at the level ($\alpha \leq 0.05$)

This table indicates that the F-value of 2787.412 is statistically significant at a significance level of less than 0.05, and that the independent variable (published page content) explains 87.5% of the variance in the dependent variable (subscribers' awareness of current and future environmental requirements and issues), which indicates a relatively high explanatory power. The correlation coefficient (R) of 0.935 indicates a strong positive correlation of 93.5% between the variables.

Parameter	Standard Error	β	t-value	Significance Level (p-value)
Constant	0.935	0.007	0.380	*0.000
Published Content (X)	0.330	-1.013	-3.064	*0.002

Table 13: Simple Regression Analysis Results

Statistically significant at the level ($\alpha \leq 0.05$)

The provided table presents the results of a simple regression analysis conducted to further explore the relationship between the content published on the Facebook page of the Algerian Ministry of Environment (X) and subscribers' awareness of their roles in sustainable environment (Y).

Key Findings:

- **Constant:** The constant value of 0.380 indicates that when there is no published content ($X=0$), the expected value of subscribers' awareness (Y) is 0.380.
- **Published Content (X):** The coefficient of -1.013 for the published content (X) suggests that there is a negative relationship between the amount of content published and subscribers' awareness. This means that as the amount of content published increases, subscribers' awareness is expected to decrease. However, it is important to note that the p-value (0.002) is less than the significance level of 0.05, indicating that this relationship is statistically significant.

Regression Equation:

Based on the results of the regression analysis, the estimated regression equation is: $Y = 0.380 + 1.013X$

This equation suggests that for every additional unit of content published on the page (X), subscribers' awareness (Y) is expected to decrease by 1.013 units, holding other factors constant.

"The standard error of the parameters (0.007) (0.330) Where X is the independent variable (content posted on the Facebook page) Y is the dependent variable (awareness of participants in their roles)

Thus, the simple regression model equation indicates that an increase of one unit in the independent variable affects the dependent variable by 0.380, which is 38%. As indicated by the standardized coefficient (0.935), the strength of the relationship between the content posted on the Facebook page of the Algerian Ministry of Environment and the awareness of participants in the roles they can play in sustainable environmental practices is 93.5%. Regarding the significance tests of the regression coefficients, the estimated value of T (52.796) for the independent variable shows statistical significance at a level less than (0.05).

Based on the above, there is a statistically significant relationship between the content posted on the Facebook page of the Algerian Ministry of Environment and the awareness of participants in the roles they can play in the context of sustainable environment, indicating that the third hypothesis is supported. This conclusion is consistent with the findings of both studies: The study by Aicha Krikat concluded that the Facebook page of the Sustainable Environment and Development Association in Jijel plays an effective role in educating its users about their roles towards their environment by highlighting both positive and negative behaviors and presenting inspirational models of individuals who contributed to sustainable environmental solutions. The page also focuses on instilling values of collective action by showcasing voluntary efforts within the community to protect and preserve the environment."

IV- Conclusion:

Based on the results obtained from the statistical analysis of field study data, which confirmed the validity of the three hypotheses, we conclude that the Facebook page of the Algerian Ministry of Environment and Renewable Energies plays a positive role in promoting environmental awareness for sustainable development. Its positive role is evident in its focus on presenting and explaining the following issues:

- Highlighting the negative behaviors of citizens towards their environment and their impacts on health, biodiversity sustainability, natural resources, and their repercussions on economic and social sectors.
- Explaining various environmental problems facing the country, focusing on pollution in its various forms, waste management, desertification, climate change, and deforestation.
- Illustrating Algeria's capabilities in the environmental sector, especially in presenting various natural resources and biodiversity abundant in the country.
- Clarifying how to preserve natural resources and biodiversity, avoid harmful environmental behaviors, and ensure future generations benefit from these resources, through launching continuous awareness campaigns in collaboration with national and international institutions and associations.
- Educating the community on the importance of participating in and joining environmental protection associations, thereby promoting community involvement in environmental sectors and achieving resource sustainability.

- Raising awareness about the need to shift towards renewable energy sources and educating on the economic benefits of their consumption.
- Detailing developmental plans aimed at improving the environmental situation, predominantly focusing on investing in natural resources, clean energy, and digital technology to address the country's environmental problems and preserve its potential for future generations.

Despite the positive role of the Facebook page of the Algerian Ministry of Environment and Renewable Energies in promoting environmental awareness for sustainable development, it requires further efforts and implementation of communication strategies to enhance this role and ensure continued productivity. To achieve this, we can offer a range of recommendations:

- Continuously and repetitively publishing legal texts related to the environment and sustainable development, explaining the penalties involved, in addition to clarifying the legal provisions in this context.
- Raising community awareness about environmental issues and sustainable development achievements through simple and clear dissemination of national and international statistics and reports.
- Strengthening the communicative and educational role of the Facebook page of the Algerian Ministry of Environment and Renewable Energies by continuously publishing community initiatives within the framework of environmental protection and development, reinforcing these efforts by honoring those who contribute to solving environmental problems and promoting them, as well as launching continuous challenges and competitions to encourage such activities.
- Activating and enhancing the role of society in environmental protection and raising awareness of its responsibility towards it through virtual seminars and workshops, facilitating direct interaction between community members and various authorities responsible for the environmental and sustainable development sectors.
- Intensifying awareness campaigns emphasizing the importance of reporting behaviors harmful to the environment and explaining the positive impacts of such actions on the environment and its sustainability. It is also crucial to clarify

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