

The Human Factor in Ecological Sustainability: The Power of Human Behavior in Achieving Ecological Transition In Morocco

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Abstract. Morocco is facing environmental challenges and has embarked on an ecological transition. The country is addressing issues like pollution, climate change, and resource depletion through strategies and initiatives. It aims to promote renewable energy, improve water management, and implement pollution control measures. The ecological transition presents economic and social challenges, requiring a balance between environmental protection and economic growth. Local communities must be involved in planning to address potential social impacts. The research conducted in a specific region contributed to understanding the ecological transition's impact on the community. However, the study faced limitations in data collection and logistics. The Moroccan government has initiated programs to improve water use efficiency, such as drip irrigation, wastewater reuse, and dam construction to store water during drought periods. Air and water pollution are also major concerns for Morocco.

Index Terms— Water management, environmental challenge, North Africa, overexploitation, individual, climate change, Sustainability.

1. Introduction

The ecological transition is a major challenge worldwide, and Morocco is no exception. The country has become aware of the environmental challenges it faces, including air and water pollution, ecosystem degradation, overexploitation of natural resources, and the need to reduce greenhouse gas emissions to combat climate change. In this context, Morocco has launched several initiatives to promote the transition to a greener economy. It has adopted a national strategy to fight climate change, aiming to lower greenhouse gas emissions and adapt to the impacts of climate change. Additionally, Morocco has implemented policies and incentives to encourage the development of renewable energy, including subsidy programs for solar and wind energy projects. Water management is also a significant challenge for Morocco. As an arid country with limited water resources, it must meet the increasing demand for water in agriculture, industry, and households. The main sources of air pollution are vehicle emissions, industrial activities, and agriculture, while agriculture, industry, and

waste contribute to water pollution. The Moroccan government has adopted stricter standards for air and water quality and implemented policies to encourage industries to reduce their polluting emissions. Waste management programs, including selective collection and recycling, have also been put in place. The ecological transition presents significant economic and social challenges for Morocco. Investments in renewable energy and environmental protection can contribute to the creation of green jobs and stimulate economic growth. However, these investments can also be costly, which may limit their adoption. The Moroccan government must find a balance between the need to protect the environment and economic imperatives. Moreover, the ecological transition can have social impacts, with local communities potentially affected by renewable energy and environmental protection projects, particularly if these projects have repercussions on their way of life or access to natural resources. Therefore, it is important to consider the social and cultural dimensions of the ecological transition and involve local communities in project planning and implementation. Morocco, a North African country, has experienced significant economic growth since the 2000s but faces numerous environmental challenges, such as soil degradation, desertification, overexploitation of natural resources, air and water pollution, and climate change. To address these challenges, the Moroccan government has launched several initiatives to promote ecological transition and reduce the environmental impact on its economic activities. In a world in constant socio-economic dynamics, the climate changes experienced globally in recent decades have emerged as a dark enemy, destroying existing human structures—social, cultural, economic, and political. In this sense, developed countries are increasingly planning adaptation and resilience models to address climate change. These models, which are quite complex to design, require an appropriate transition approach.

Like any subject in life, we encountered numerous and varied gaps, whether personal or professional. Firstly, the scope of intervention was vast and complex, making it difficult to delimit our study and ensure the relevance of our results and conclusions. Nonetheless, after all the hard work and effort, we were able to focus on a specific geographical region to produce meaningful and useful conclusions for the concerned community, of which we were a part. Thus, this research not only enriched our knowledge of the subject but also contributed to the overall understanding of ecological transition and its impact on the local community. Furthermore, it is important to note that our article, although ambitious, cannot claim to solve all the theoretical and practical issues inherent to the ecological transition. The inherent complexity of the research subject has led to multiple practical obstacles, particularly in data collection and logistics, which hindered the realization of in-depth analyses.

This article presents a concrete model of ecological transition, which involves a shift towards sustainable development that renews our modes of consumption, production, work, and social climate in order to collectively overcome major environmental challenges such as ecological transition, resource scarcity, biodiversity degradation, and the proliferation of environmental health risks. The main purpose of this article is to enrich the discourse on ecological transition in Morocco, with a focus on the Souss Massa region. It pursues three main objectives:

- First and foremost, it proposes a model that can be used as a reference framework and serve as a decision-making tool for the Souss Massa region specifically, and Morocco more broadly.
- Secondly, it highlights the various socio demographic dimensions that impact individuals' ecological behavior.
- Finally, it aims to justify the relevance, or lack thereof, of Morocco's increased investment in ecological transition, particularly in the Souss Massa region.

By addressing these objectives, the article aims to contribute to the understanding and promotion of ecological transition in Morocco, providing insights and guidance for decision-makers in the Souss Massa region and beyond.

2. Methodology :

For our article, we have adopted a post-positivist epistemological position from a critical realist perspective to address our research problem related to understanding individuals' ecological behavior in the Souss Massa region. Our intention is to evaluate the perception of individuals residing in this region, who constitute the target population of our study, through a preliminary study aimed at anticipating possible scenarios. The choice of the post-positivist paradigm from a critical realist perspective is deemed most appropriate for our research problem as it is based on an a priori conception of reality and aligns with the fundamental assumptions of this paradigm. In the initial exploratory phase of our study, we employed a qualitative approach using both group and individual interviews as data collection tools. In the second phase, we opted for a quantitative approach utilizing a survey as the data collection instrument. We utilized SPSS AMOS for exploratory and confirmatory analysis. Additionally, we employed the Partial Least Squares (PLS) approach, which lies between confirmatory and restrictive exploratory approaches. According to Creswell et al.'s classification (2003), our research design can be considered exploratory, involving the use of qualitative methods to discover relevant themes related to a given question, and then utilizing these themes to design and administer an instrument for collecting data, which will subsequently be analyzed quantitatively. By adopting this methodological approach, we aim to provide a comprehensive understanding of the ecological behavior of individuals in the Souss Massa region, considering both qualitative insights and quantitative analysis.

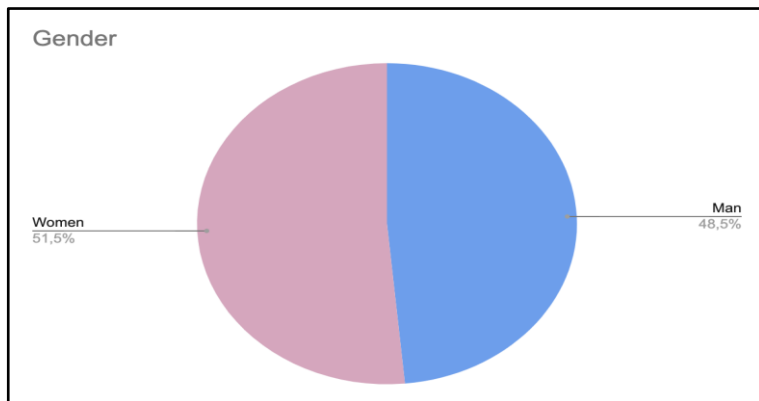
3. Data Analysis :

We have relied upon this analysis, which is deemed fundamental. The objective is to succinctly and meaningfully depict observed data in order to facilitate their analysis. Descriptive statistics tasks involve presenting the data in the form of tables, graphs, and statistical indicators. Statistics aims to gather observations regarding subjects exhibiting specific characteristics and express them numerically to derive information about said characteristics. It serves as a branch of statistics encompassing numerous techniques employed to describe extensive datasets. The primary aim of descriptive statistics is to structure and represent the information encapsulated within the data, as well as to summarize or depict the data using statistics, particularly when dealing with large quantities of data. The objective of our study is to succinctly and meaningfully describe the observed data in order to facilitate their analysis. We present the results of our study conducted on a sample of 206 surveyed individuals. We found that the majority of our respondents are women, accounting for 51.5%, while men constitute 48.5% of the sample. The information provided is based on the data collected and analyzed in our study.

A. Gender:

The presented graph depicts the distribution of respondents according to their gender within a sample of 206 individuals. This type of graphical representation, known as a pie chart, is particularly suitable for visualizing categorical data such as gender. Based on this graph, we can observe that the proportion of women (51.5%) is slightly higher than that of men (48.5%). In absolute terms. Indeed, the distribution of respondents according to their gender can have an impact on the results and conclusions of studies. Behaviors and attitudes towards the environment can vary depending on individuals' gender, and this can also influence the

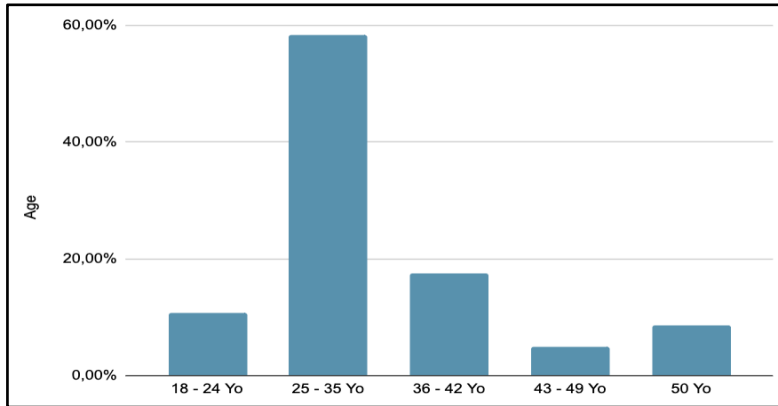
analysis and understanding of issues related to ecological transition, as well as the implementation of more effective and inclusive communication and action strategies. In conclusion, this graph allows us to better understand the composition of the sample according to the gender of the respondents, which can be useful for interpreting the study's results and guiding future analyses.



Graph 1 : Gender of sample

B. Age

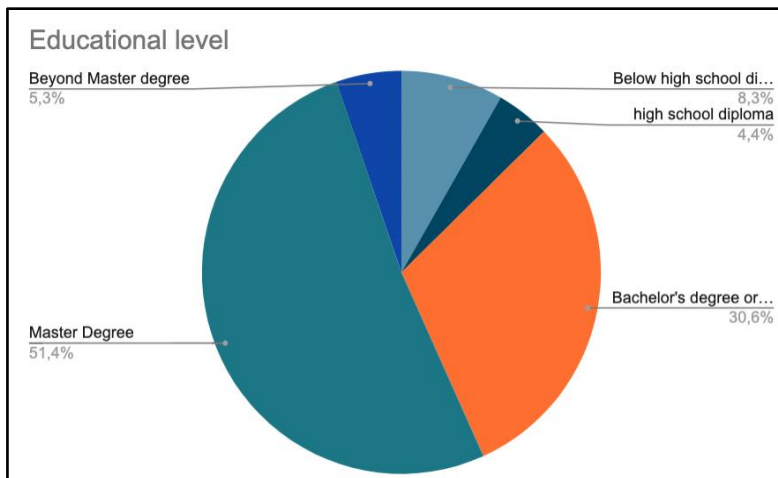
The bar graph presented provides an overview of the distribution of respondents by age group within a sample of participants. We can observe that the proportion of respondents aged 25 to 35 is the highest, accounting for 58.30% of the studied sample. On the other hand, the category of respondents aged 43 to 49 is less represented, comprising only 4.90% of the sample. Several factors can explain this distribution of age groups. Firstly, it should be noted that the survey was conducted online, which likely favored the participation of young adults who are generally more connected and utilize digital platforms more frequently. This demographic is also more represented in the workforce and may therefore be more likely to participate in online surveys. Additionally, it is important to mention that the survey was also conducted face-to-face to ensure representation of the older age groups (43 years and above). This method may be more effective in reaching this population segment, but it can also result in a lower representation within the overall sample, which may explain the obtained rate (8.7% of the studied sample). In conclusion, the distribution of age groups can have an impact on the results and conclusions of the survey. By better understanding the sample's age distribution, it is possible to interpret the results more accurately and consider these differences in future analyses.



Graph 2 : Age range of the sample

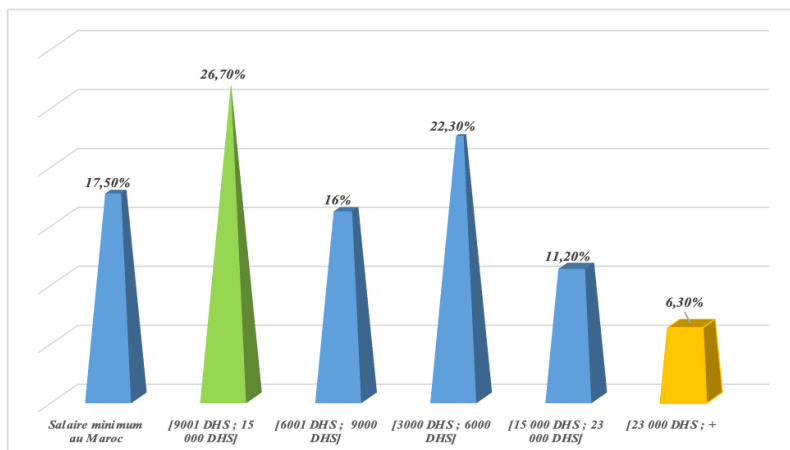
C. Educational level

In terms of educational level, our sample can be described as "elitist" as the majority of respondents (51.5%) reported having pursued higher education up to the Master degree level, while only 8,3% indicated having no formal education. This finding is not surprising considering that the study was predominantly conducted online, limiting participation to individuals who can read and write. We are aware of this limitation and made efforts to reach out to individuals with lower educational backgrounds. Overall, the data from the graph highlights that respondents with a Master's degree represent the largest proportion of the population at 51.5%, compared to those with only a high school diploma at 4.4%.



Graph 3 : Educational level of the sample

D. Income Range



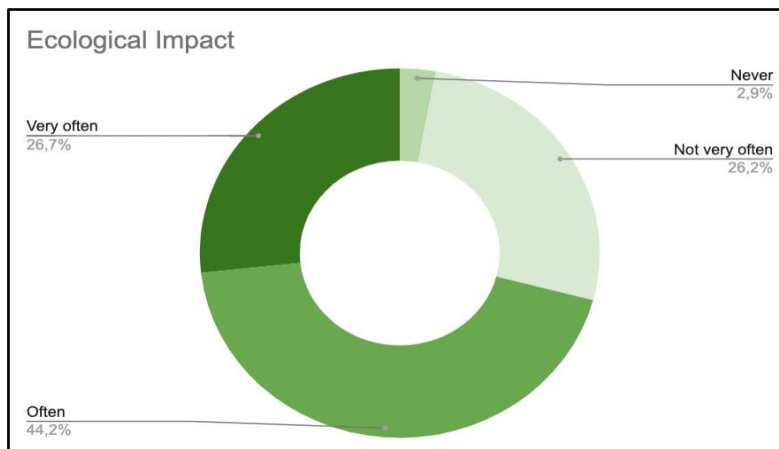
Graph 4 : Income range of the sample

Based on the survey results, there is noticeable heterogeneity in the distribution of salaries among the respondents. A significant proportion of the respondents (26.7% of the sample) fall within the salary range of 6001 DHS to 9000 DHS, indicating that this salary range is relatively common among the surveyed individuals. On the other hand, only 6.30% of the respondents receive a salary of 23,000 dirhams or more, suggesting that higher salaries are relatively rare in the studied sample. This observation provides insights into the income distribution within the surveyed population. Furthermore, it is worth noting that 36 individuals, accounting for 17.5% of the respondents, are living with the minimum wage in Morocco. This information can be considered concerning as the minimum wage is often regarded as the minimum remuneration necessary for a decent standard of living. Lastly, the graph reveals that a significant number of respondents receive a salary ranging from 9001 dirhams to 15,000 dirhams, representing 26% of the sample. This finding indicates that this salary range is quite common among the respondents. Overall, these results provide a better understanding of the salary distribution within the studied sample.

E. Ecological impact

The survey results demonstrate that ecological issues are a significant concern for the majority of the respondents. More than half of the participants (44.2% out of 206 surveyed individuals) reported frequently experiencing ecological problems. This proportion is considerable and can be interpreted as an indication that ecological issues are a major concern for this population. Additionally, it is interesting to note that only 2.90% of the respondents claimed to have never encountered any ecological problems. This suggests that ecological issues are pervasive in the daily lives of most of the respondents. Among the respondents, 26.7% stated that they very frequently experience ecological problems, which is the second most common response. This information implies that certain ecological problems are particularly recurrent in the daily lives of this population. Finally, it is important to highlight that 26.2% of the respondents often face ecological problems, making it the third most common response. This observation confirms that ecological problems are highly prevalent among the surveyed individuals. In summary, the results of this survey indicate that ecological issues are a significant concern for most of the respondents. The findings also suggest that ecological problems are common in the daily lives of this population. These

results could be useful in understanding the environmental concerns of this population and in formulating public policies to promote environmental protection.



Graphique 5 : Ecological Impact on the sample

4. Results :

Based on the presented analysis, we have gathered valuable insights that can guide us in formulating recommendations. The study reveals that the majority of respondents are women, emphasizing the importance of considering gender in analyzing ecological issues. It is recommended to explore variations in behaviors and attitudes towards the environment based on gender for more effective strategies. Additionally, efforts should be made to ensure balanced age group representation by employing online and face-to-face methods, and inclusivity in education should be promoted by reaching individuals with diverse educational backgrounds. Also, the distribution of salaries highlights income inequality, warranting policy interventions for fair wages. Proactive measures are needed to address ecological challenges, and public policies should be developed to protect the environment based on the concerns expressed by the surveyed population. In conclusion, considering gender, age group representation, inclusivity in education, income distribution, and ecological problems can enhance understanding, guide future analyses, and facilitate the development of effective action plans.

5. Conclusion

The empirical results obtained in this article are particularly significant for validating our model, as they have confirmed several research hypotheses. Indeed, the choice to focus on the human aspect in understanding and modeling ecological transition is not a random one, as human beings are central actors in this process of change. The findings of our study have shed light on socio demographic dimensions that are often overlooked in the support and assistance policies implemented by the government to promote ecological transition. In this regard, the results of this research are of great utility for leaders and policymakers who seek to integrate human dimensions into their public policies. They are also valuable for homemakers and anyone interested in understanding the impact of their behavior on the overall ecological transition. Consequently, the findings of this research provide an opportunity to reconsider the current perspective on ecological transition and to incorporate human dimensions for a more sustainable and inclusive transition. Our work falls within the

scope of studying ecological transition but from a strategic management perspective. We aimed to shed light on the existing relationship between individuals and the impact of their ecological behavior on the overall transition. This article focused on the ecological transition in the Souss Massa region of Morocco to demonstrate its influence on this dynamic process. The main objective was to highlight the various dimensions that affect ecological behavior and subsequently extract the ecological aspects of each dimension, while providing arguments for our selection based on qualitative and quantitative research. Furthermore, this article also provided an overview of the ecological context in Morocco, which is aware of the environmental challenges it faces, such as air and water pollution, ecosystem degradation, and overexploitation of natural resources. The study aimed to explain the connection between individuals' ecological behavior and the primary objective of ecological transition. Specifically, we focused on individuals in the Sous Massa region to analyze their behaviors, knowledge, level of awareness, and economic capacity in confronting this transition. The research findings offer significant contributions in methodological, theoretical, and practical aspects. However, it is important to note that certain limitations were encountered, which could pave the way for future research endeavors.

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