

The ecological footprint reduction practices of Moroccan SMEs: constraints or opportunities

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Abstract: This study examines the determinants of the adoption of ecological footprint reduction practices by Moroccan SMEs, using institutional theory as an analytical framework. The main objective is to understand how institutional pressures and financial constraints influence SMEs' decisions while assessing the opportunities that these practices can offer. The research sample comprises 254 Moroccan SMEs selected to ensure a diverse representation of economic sectors. The empirical analysis is based on a binary logit model, chosen for its ability to evaluate the probability of adopting ecological practices given the binary nature of the dependent variable (adoption or not). The results reveal that coercive pressures related to environmental regulations have a positive and significant impact, encouraging SMEs to adopt sustainable practices. Normative pressures also play an important role, reflecting the influence of societal expectations and business partners. However, mimetic pressures show no significant effect, indicating that imitation of sector leaders is not a determining factor. Opportunities, such as access to new markets and reputation enhancement, prove to be important levers, but financial constraints remain a major obstacle for many SMEs.

Keywords: ecological footprint, institutional theory, sustainable development, financial constraints, opportunities, SMEs.

JEL Classification: Q56, L25, M14.

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1. Introduction

Climate urgency and environmental degradation have become major global concerns, deeply impacting economic and social priorities. In this context, companies, particularly SMEs, play a crucial role in the transition toward sustainable development. Representing a significant share of Morocco's economic fabric, SMEs find themselves at a crossroads between pressures to adopt ecological practices and constraints limiting their capacity to engage in this transition. In Morocco, environmental protection has risen to the level of a national priority, supported by ambitious governmental initiatives and increasingly stringent environmental legislation. This dynamic reflects a commitment to promoting economic development that respects natural resources while enhancing business competitiveness on the international stage. However, for SMEs, adopting ecological footprint reduction practices goes beyond mere compliance with legal requirements; it raises fundamental questions about the costs and benefits of such initiatives.

The challenges faced by Moroccan SMEs are numerous. On the one hand, they must navigate an increasingly complex regulatory environment, with coercive pressures compelling them to comply with ecological standards under the threat of sanctions. On the other hand, they face growing expectations from commercial partners, customers, and civil society, demanding clear commitments to sustainability. Nevertheless, these constraints can also be viewed as opportunities: ecological compliance facilitates access to new markets, enhances reputation, and fosters strategic partnerships. This paper explores the dual nature of ecological practices adoption by Moroccan SMEs: is it a financial constraint or, conversely, a lever for opportunities? By using institutional theory, this study provides an analytical framework to understand how SMEs respond to ecological demands. By examining factors that hinder or facilitate this adoption, the research aims to shed light on the strategic challenges and choices that SMEs face.

2. Literature review

Tachizawa, Gimenez, and Sierra (2015) explore the potential benefits of ecological practices in the supply chain, arguing that they can drive innovation and improve business competitiveness. They emphasize the strategic role of these practices in differentiating companies in the market and meeting stakeholder expectations. Hillary (2004) extends this reflection by highlighting the specific challenges small businesses face, notably the lack of resources. However, he shows that adopting environmental management systems can yield significant benefits in terms of compliance and efficiency, with cost reductions that, over time, become crucial assets. Chambers and Lewis (2001) focus on the ecological footprint as a vital measurement tool, especially for small and medium-sized enterprises that, despite their significant contribution to industrial pollution, can play a key role in sustainable development. They suggest that this tool helps guide decisions toward sustainable management and facilitates communication on environmental progress. Warhurst (2002) follows this line by introducing a framework of sustainable performance indicators that assess specific improvements before aggregating them to measure overall performance. He argues that, although difficult to implement, these practices offer significant opportunities to enhance companies' environmental outcomes.

Peter Yacob et al. (2017) provide further insights by analyzing green initiatives in the manufacturing sector, particularly among SMEs in electronics and electricity. They observe that practices such as energy efficiency and water conservation are positively perceived, contributing to cost reduction and increased competitiveness. However, they note that waste management is often seen as a constraint, suggesting that some initiatives still need to be optimized to maximize environmental impact. Masocha (2018), Banerjee (2002), and Uhlaner et al. (2012) present complementary perspectives on the challenges and opportunities related to environmental sustainability for SMEs. Masocha highlights the

perception of financial constraints due to green technologies and strict regulations but emphasizes that these constraints can stimulate ecological innovation, thus enhancing business competitiveness. Banerjee supports this view, explaining that integrating environmental strategies into organizational planning not only addresses ecological challenges but also opens sustainable development opportunities, allowing businesses to invest proactively in environmentally friendly initiatives. Uhlaner et al. stress the importance of regulations as a catalyst for adopting sustainable practices while acknowledging that overcoming resource limitations can transform obstacles into drivers of innovation and growth.

Carballo Penela and García-Negro (2008) and Pimenova and Van der Vorst (2004) deepen these ideas by focusing on the solutions and support needed for SMEs. Carballo Penela and García-Negro examine the impact of ecological footprint reduction in the fishing sector, showing that despite initial constraints, these efforts can lead to economic efficiency gains and the opening of new markets. Pimenova and Van der Vorst expand on this by emphasizing the role of support programs and environmental policies for SMEs. They note that a lack of resources and knowledge can hinder small businesses' efforts, but institutional support and incentives can help them achieve efficiency gains while reducing their environmental impact. Collectively, these authors demonstrate that despite the challenges, strategic approaches and appropriate support can turn environmental constraints into opportunities for sustainable performance. McDonough et al. (2002) highlight the idea that reducing the ecological footprint, far from being a constraint, can become a vector for creating economic, ecological, and social value when practices are smartly designed. Their Cradle-to-Cradle concept replaces traditional industrial models by promoting waste-to-resource transformation, respecting natural cycles, and producing large-scale positive effects. This proactive vision inspires lasting benefits while considering the global impact of environmental practices.

Ghita et al. (2018) enrich this perspective by explaining that integrating ecological footprint reduction strategies into sustainable development and eco-innovation opens new opportunities. Ecological innovation, by increasing resource efficiency, contributes to lowering environmental impacts, even though obstacles may persist due to the complexity of existing infrastructures. This view links the reduction of environmental impacts to concrete improvements in organizational processes. Condon (2004) addresses the situation of SMEs, which, although facing sustainability challenges due to a lack of knowledge and resources, demonstrate remarkable adaptability. He emphasizes that this flexibility allows them to react quickly to change, making it an asset for implementing green practices. This feature distinguishes SMEs from large companies and gives them a certain agility to turn potential constraints into competitive advantages. Petts et al. (1999) also focus on SMEs, discussing the perception of environmental regulations as a constraint. However, they observe that some companies, by integrating these regulations into their business model, manage to improve their competitiveness and image. The integration of environmental standards then becomes a profitable strategy that can strengthen their market position while meeting societal expectations.

Musa and Chinniah (2016) complement this discussion by highlighting that SMEs face significant challenges in reducing their ecological footprint, mainly due to limited resources, both in financing and skilled human capital. Insufficient awareness of sustainable practices also prevents many businesses from realizing potential benefits. This lack of resources and understanding underscores the need for tailored solutions to encourage more effective environmental management. Szigeti, Cecília et al. (2021) present the idea that the ecological footprint serves as a simple and standardized indicator of environmental performance, particularly well-suited for SMEs. Although this measure is sometimes perceived as a constraint, it can be transformed into a source of significant opportunities. Optimizing processes not only reduces resource-related costs but also improves the company's image among

stakeholders. In this perspective, green initiatives can yield indirect benefits, such as improved energy efficiency and increased eco-efficiency, thus enhancing overall business performance.

Elkington (1997) develops the concept of the "triple bottom line," where environmental, social, and financial outcomes are integrated. For him, reducing the ecological footprint is not merely about mitigating negative effects but serves as a strategic lever that can create value by meeting stakeholder expectations and enhancing competitiveness. This holistic approach emphasizes that sustainable practices are compatible with long-term economic goals. Hillary (2000), on the other hand, observes that although SMEs recognize the importance of environmental performance, it is often relegated to secondary status. However, concrete examples show that these companies can turn these challenges into competitive advantages, notably through cost savings and an improved reputation among partners. Terziovski and Guerrero (2014) explore the effects of sustainable practices on innovation, explaining that although companies may initially view these practices as constraints, they can become drivers of competitiveness over the long term. Focusing on resource efficiency and investing in ecological solutions not only promotes economic sustainability but also fosters creativity in developing new products or services. Ammenberg and Hjelm (2003) point out that for many SMEs, environmental initiatives are seen as burdens threatening their immediate economic viability. However, when integrated effectively, they offer tangible benefits, such as resource optimization, energy savings, and improved regulatory compliance, demonstrating that these measures can be strategically leveraged.

Boiral et al. (2014) explore the influence of managerial attitudes on the adoption of environmental practices. A proactive approach enhances stakeholder collaborations and generates strategic value for the company. The authors, however, highlight the challenge of measuring long-term success, a difficulty that pushes companies to continuously adjust their strategies. Cagiao et al. (2011) focus on the cement industry, describing how the adoption of best production techniques contributes to reducing CO₂ emissions. Although these practices require significant initial investments, they improve overall efficiency and promote sustainable solutions that strengthen competitiveness. Techniques such as clinker reduction or the use of alternative fuels underscore the importance of balancing economic performance with environmental goals. Soares and Chaves (2017) explain that calculating a company's ecological footprint, perceived as a strategic tool, allows for market differentiation and enhanced transparency with stakeholders, including customers, investors, and regulators. They add that this method helps identify cost reduction opportunities through green technologies, even though external factors like regulation and climate variability may limit its effectiveness. Carballo-Penela and García-Negro (2009) support this idea, asserting that carbon footprint calculation methodologies, such as MC3, encourage sustainable practices, facilitate the identification of major emission sources, and pave the way for competitive innovations within companies.

Porter and Van der Linde (1995) argue that the perception of ecological practices as mere costs needs to be rethought. They assert that well-integrated environmental initiatives can yield economic benefits that exceed initial investments, particularly through resource and process optimization. Franco and Rodrigues (2019) offer a specific perspective on SMEs, explaining that the adoption of ecological practices, although often viewed as a constraint due to limited resources and corporate culture, can enhance reputation, stakeholder trust, and ultimately financial performance. Mateo-Mantecón et al. (2011) describe the ecological footprint as a key indicator of the impact of human activities on the environment. They demonstrate that reducing the carbon footprint, despite the associated constraints, presents opportunities, particularly through improved energy efficiency and the use of sustainable materials. Bebbington et al. (2007) complement this view by emphasizing the need to develop models and tools to quantify sustainability, while considering ecological footprint reduction as a potential lever for enhancing corporate sustainability efforts.

3. Methodology

3.1. Hypotheses and model

Institutional theory is widely applied to analyze how organizations respond to external pressures in various contexts, including environmental sustainability. DiMaggio and Powell (1983) introduced key concepts of coercion, norms, and mimicry to explain why and how companies adopt practices that align with institutional expectations. Scott (1995) further elaborated on this theory by identifying institutional mechanisms that influence organizational behaviors, especially in the context of adapting to ecological norms. These works highlight the significance of institutional pressures in transforming corporate strategies, particularly when companies seek to reduce their ecological footprint. Institutional theory provides a useful framework for understanding the strategies businesses adopt to minimize their ecological impact. It focuses on coercive, normative, and mimetic pressures that influence organizational decisions concerning sustainability and green innovation.

- **Coercive Pressures:** Coercive pressures stem from laws and regulations imposed by governments and international organizations. These pressures compel companies to adhere to strict standards to avoid legal sanctions or fines. For instance, both local and international environmental regulations require firms to comply with standards such as ISO 14001, which governs environmental management systems, or CO₂ emissions rules aimed at limiting air pollution. These mandatory measures drive companies to integrate sustainable practices into their overall strategy, even if this may necessitate investments to upgrade their technologies and industrial processes.
- **Normative Pressures:** Normative pressures arise from social expectations, professional norms, and stakeholder influences. Businesses experience pressure from their commercial partners, professional associations, and public opinion, which expect them to adopt ecological practices. To meet these expectations, companies invest in green technologies and optimize their processes to minimize environmental impact. Moreover, adopting these practices is often crucial for maintaining a good reputation among environmentally conscious consumers and accessing green financing, which rewards sustainable initiatives with favorable financial conditions. SMEs, in particular, need to demonstrate their commitment to sustainability to attract and retain a growing environmentally aware customer base.
- **Mimetic Pressures:** Mimetic pressures occur when companies imitate the practices of market leaders in an environment of uncertainty to gain a competitive advantage or legitimize their actions. This phenomenon is common in sectors where ecological innovation is seen as a key success factor. For example, an SME observing a leading company in its sector adopting biodegradable packaging or launching an eco-friendly product line may be motivated to follow suit to remain competitive. This imitation goes beyond product innovation and extends to marketing strategies, production processes, and the sustainable use of natural resources.
- **Institutional Adaptation:** To stay competitive in the face of these institutional pressures, SMEs must proactively adapt their internal processes. This includes revising supply chains, optimizing energy efficiency, and reducing waste. Companies often collaborate with sustainability experts or certification bodies to ensure a smooth transition to practices that meet environmental standards. Institutional adaptation may also involve training employees on new ecological norms, ensuring that the entire organization is engaged in a continuous improvement process.

- **Opportunities:** The integration of environmental practices not only presents challenges but also offers significant opportunities. By complying with ecological standards, companies can access new markets and develop strategic partnerships. For example, governments and financial institutions often offer grants and incentives to support sustainable initiatives. Furthermore, environmental compliance enhances a company's reputation and social legitimacy, strengthening trust among customers, investors, and regulators. This can also create lasting competitive advantages, particularly in sectors where sustainability has become a key criterion for differentiation.
- **Constraints:** However, adopting these sustainable practices comes with considerable constraints. The initial cost of compliance with environmental standards can be high, posing a significant challenge, especially for SMEs with limited resources. Additionally, the transition to sustainable practices often requires investments in training and new technologies, which can temporarily disrupt operations. The lack of skilled personnel to manage these transformations and the need to reorganize internal processes add further complexity. Companies must, therefore, balance these costs and challenges with the potential long-term benefits to ensure their competitiveness and sustainability.

Thus, institutional theory provides a framework that can explain how SMEs adapt their ecological strategies in response to coercive, normative, and mimetic pressures. From these elements, the following research hypotheses can be developed:

- **H1: Coercive pressures imposed by environmental regulations positively influence the adoption of sustainable practices by SMEs.**
- **H2: Normative pressures exerted by commercial partners and societal expectations increase SMEs' commitment to sustainability.**
- **H3: Mimetic pressures drive SMEs to imitate the ecological practices of sector leaders to strengthen their legitimacy.**
- **H4: Institutional adaptation enables SMEs to better integrate environmental standards and improve their competitiveness.**
- **H5: Opportunities provided by environmental compliance facilitate access to new markets and partnerships.**
- **H6: Organizational and financial constraints hinder the adoption of ecological practices by SMEs.**

Institutional theory, by describing coercive, normative, and mimetic pressures, offers a framework for understanding how SMEs adjust their ecological strategies. Based on these elements, the following econometric model can be constructed to assess the impact of these pressures and adaptations on the adoption of sustainable practices by SMEs:

$$ECOP = \beta_0 + \beta_1.CPRS + \beta_2.NPRS + \beta_3.MPRS + \beta_4.INAD + \beta_5.OPPT + \beta_6.CNST + \beta_7.FRMS + \beta_8.EXIN + \varepsilon$$

The adoption of ecological practices (ECOP: Ecological Practices Adoption) is the dependent variable in this study. It is a binary variable, taking the value of 1 when ecological practices are adopted, and 0 otherwise. The explanatory variables include coercive pressures (CPRS: Coercive Pressures), which arise from local and international environmental regulations, and normative pressures (NPRS: Normative Pressures), influenced by commercial partners and societal expectations. Mimetic pressures (MPRS: Mimetic Pressures) are also considered, which drive SMEs to imitate sector leaders' practices to remain competitive. Institutional adaptation (INAD: Institutional Adaptation) reflects the adjustment of internal processes to environmental standards, while opportunities (OPPT: Opportunities) refer to the competitive advantages and new markets accessible through ecological compliance. Constraints (CNST: Constraints) encompass organizational and financial obstacles that slow down the

transition to sustainable practices. These variables are qualitative and measured using six items each, assessed on a 1 to 5 Likert scale. The average of the responses for each item is calculated to generate a variable representing the studied concept. Finally, control variables such as firm size (FRMS: Firm Size) and export intensity (EXIN: Export Intensity) are included in the model.

3.2. Choice of Logit Model

The use of a logit model to analyze the ecological footprint reduction practices of Moroccan SMEs is justified by several reasons closely related to the nature of the variables and the study's objectives. The dependent variable, ECOP, corresponds to the adoption of ecological practices, modeled as a binary variable (0 = non-adoption, 1 = adoption). In this context, the logit model is particularly suitable for estimating the probability that an SME adopts ecological practices based on various explanatory variables. The logit model provides interpretable coefficients expressed in terms of marginal probabilities, facilitating the understanding of how these pressures influence SMEs' decision-making. The choice of the logit model also offers significant methodological advantages. This model assumes a logistic distribution of errors, which is well-suited for binary decisions like adopting or not adopting ecological practices. Moreover, it enables the production of conditional adoption probabilities, which are more meaningful for interpreting results than simple linear coefficients. The research hypotheses formulated in this study align with the logit model approach, as they aim to evaluate the direct effects of institutional pressures, constraints, and opportunities on the probability of adoption.

3.3. Data presentation

The sample for this study consists of 254 Moroccan SMEs, selected to explore the adoption of ecological practices and understand the institutional, organizational, and economic factors influencing this adoption. These companies come from various sectors, ensuring adequate representativity and avoiding sectoral bias. The diversity of firms included in the sample reflects the different normative, coercive, and mimetic pressures they may face, depending on their specific institutional environment. The sample was constructed by considering several structuring characteristics, such as the size of the companies and their export intensity. Firm size was included as an explanatory variable, as it may influence the capacity to adopt ecological standards due to available resources. Similarly, the level of international integration, measured by export intensity, is a relevant dimension since firms more oriented toward international markets are often exposed to higher environmental demands from foreign partners or international markets.

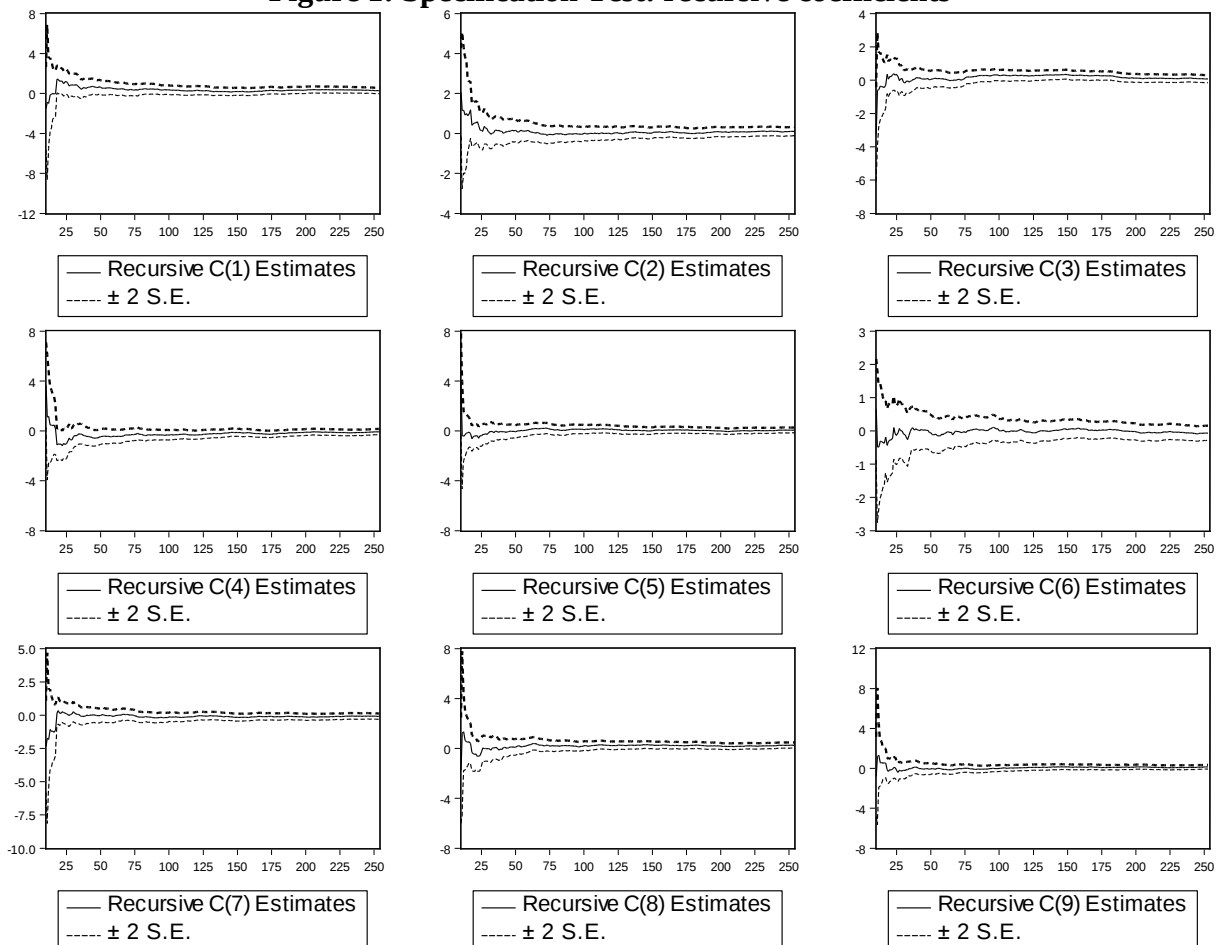
The companies in this sample are subject to various institutional pressures, such as coercive pressures arising from national or international environmental regulations. Additionally, normative pressures exerted by commercial partners, eco-conscious consumers, and professional associations play a key role in the adoption of ecological practices. The companies in the sample must also contend with mimetic pressures, which push them to imitate the practices of leading firms to remain competitive and legitimate. The study also considers the financial and organizational constraints specific to Moroccan SMEs, which may hinder the ecological transition. The cost of compliance with environmental standards can be a significant barrier, particularly for smaller companies or those with limited resources. However, the sample also includes firms for which ecological compliance represents an opportunity to access new markets, secure green financing, or enhance their reputation among stakeholders.

4. Results

4.1. Robustness of the Logit Model

Figure 1 presents the evolution of the recursive coefficients estimated in the logit model. Using recursive coefficients, rather than the Ramsey RESET test, allows for the assessment of the stability of the model's parameters as observations are added. This approach is particularly useful in nonlinear models like the logit, where it is crucial to check whether coefficients converge or undergo significant variations that might indicate specification errors. The advantage of this approach over the Ramsey RESET test lies in its ability to provide a detailed view of the trajectory of each coefficient. While the Ramsey test focuses primarily on linearity and overall specification, the analysis of recursive coefficients allows for a more nuanced tracking of their evolution, enabling the detection of potential issues with greater precision.

Figure 1: Specification Test: recursive coefficients

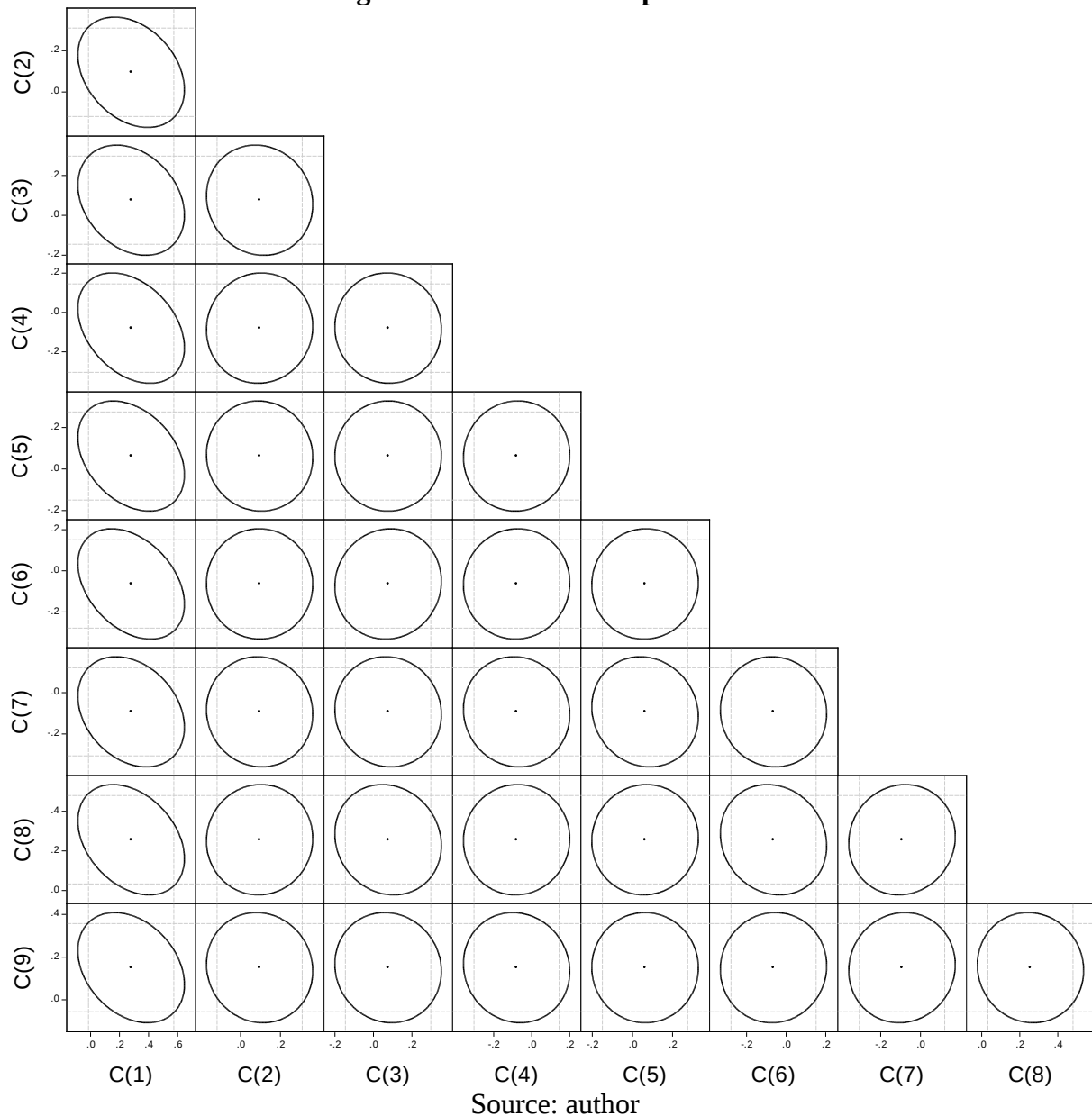


Source: author

The figure indicates that the coefficients stabilize quickly and remain within the confidence bounds, signaling reliable model convergence as data is progressively added. This coefficient stability suggests that the parameters are well-estimated and that the model accurately captures the relationships between the dependent variable and the explanatory variables. In the absence of significant oscillations or deviations from the confidence bounds, it can be concluded that the model is correctly specified and that the results are robust and reliable. The use of confidence ellipses in collinearity analysis for a Logit model is justified by their ability to visualize the relationship between the estimated coefficients. Unlike simple numerical measures such as the Variance Inflation Factor (VIF), confidence ellipses provide a graphical representation of the correlations between coefficients. Each ellipse illustrates the dispersion

and orientation of coefficient pairs, offering a visual assessment of linear dependence among them. This graphical approach enhances the understanding of potential collinearity issues, allowing for a clearer interpretation of how closely related the coefficients are.

Figure 2 : Confidence ellipse matrix



The analysis of Figure 2 shows that the ellipses are almost circular, indicating a relatively low correlation between the coefficients. This observation suggests that the explanatory variables used in the Logit model are sufficiently independent of each other, thereby minimizing the risk of collinearity. The presence of collinearity in a Logit model can complicate the interpretation of coefficients, as it may inflate standard errors and render estimates unstable. The figure seems to suggest that the model is well-specified, with few signs of strong collinearity among the variables. This enhances confidence in the validity of the results, as each coefficient can be interpreted independently without significant overlap among the explanatory variables.

The White test is well-suited for analyzing heteroskedasticity in Logit models due to its non-parametric characteristics and flexibility. In Logit models, where the dependent variable is binary and

the relationships between explanatory variables and the probability of event occurrence are nonlinear, the classical assumption of homoskedasticity can be challenging to uphold. Heteroskedasticity arises when there is non-constant variability in the residuals, which can bias standard errors and lead to misleading results, particularly in hypothesis testing. Unlike other tests, such as the Breusch-Pagan test, which assumes a linear dependence between the variance of errors and explanatory variables, the White test provides greater flexibility by not requiring any specific assumptions about the form of heteroskedasticity. This ability to detect nonlinear relationships makes the White test particularly relevant for Logit models.

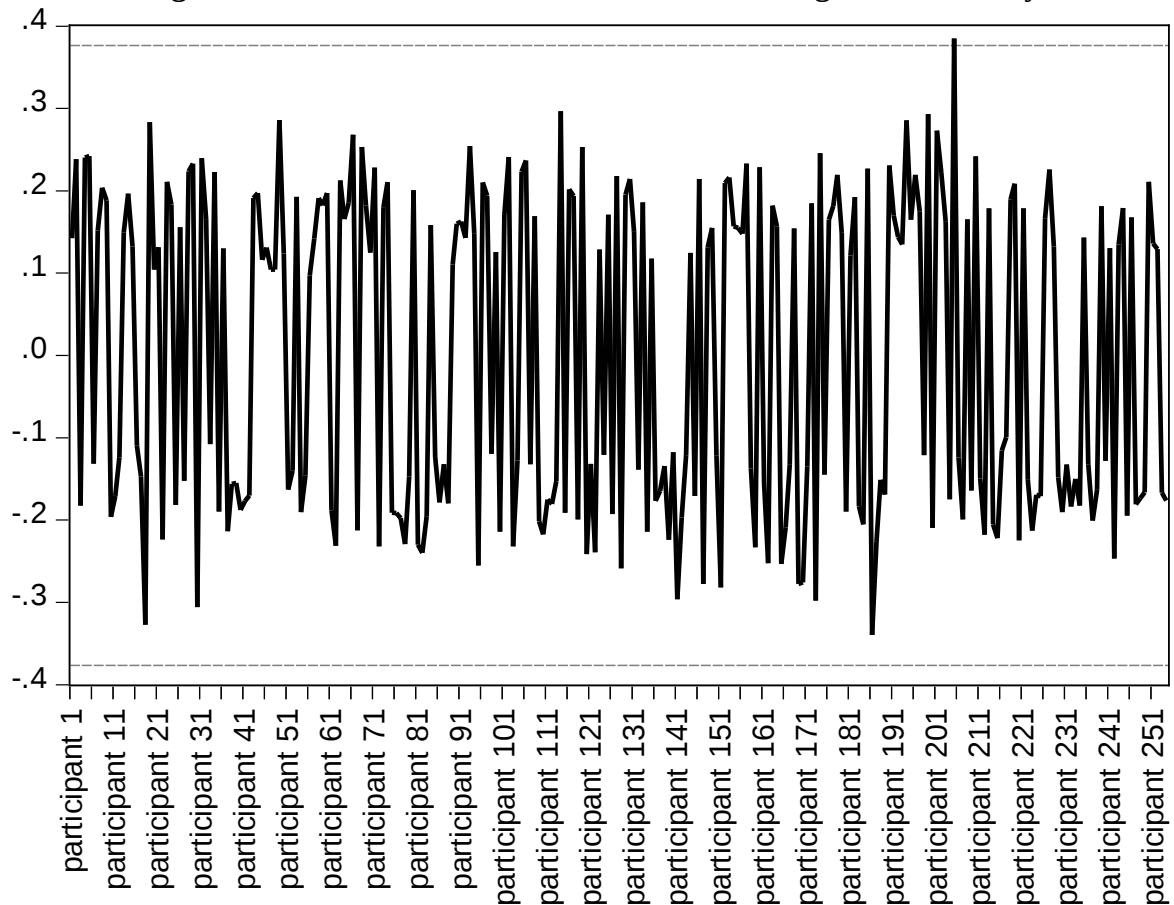
Table 1: Heteroskedasticity Test: White Test

Statistic	Value	Probability
F-statistic	0.912211	Prob. F(44,209)
Obs*R-squared	40.92067	Prob. Chi-Square(44)
Scaled explained SS	3.476315	Prob. Chi-Square(44)

Source: author

Table 1 shows that the White test did not detect any significant heteroskedasticity in the Logit model used for this study. The F-statistic is 0.912 with an associated probability of 0.6315, indicating that the null hypothesis of homoskedasticity cannot be rejected at the 5% significance level. Similarly, the Obs*R-squared statistic has a value of 40.92, with a Chi-square test probability of 0.6044, further confirming the absence of heteroskedasticity. The Scaled Explained SS statistic, with a probability of 1.0000, reinforces this conclusion. These results collectively indicate that the residuals of the Logit model exhibit constant variance, and no form of heteroskedasticity is observed.

Evaluating model stability is crucial in any empirical study, especially when using a Logit model, given the nonlinear relationships between variables. A model is considered stable when the coefficient estimates and their significance are not heavily influenced by specific observations. If some observations excessively impact the results, it can compromise the reliability and robustness of the conclusions. The DFFITS statistic is used to measure the influence of a particular observation on the model results by checking how the prediction changes when that observation is removed.

Figure 3: DFFITS Influence statistics for assessing model stability

Source: author

Figure 3 presents the DFFITS values for the 254 participants in the Logit model. Each point illustrates the contribution of a specific observation to the model's stability. If a DFFITS value is very high, it suggests that the observation might have a disproportionate effect on the coefficients and potentially distort the model's results. Significant variations in DFFITS can indicate that removing or including a particular observation significantly alters the model fit, raising concerns about the robustness of the estimates. The analysis of the figure shows that DFFITS values oscillate around zero, with few observations exhibiting extreme values that would suggest excessive influence. This indicates that the Logit model is generally stable and that the results are not dominated by a small subset of the sample. The fluctuations observed are normal for a diverse sample and do not pose a major threat to the model's validity. Although a few observations exceed the influence thresholds slightly, their number remains limited, implying that the overall impact of these observations is manageable. Therefore, it is not necessary to eliminate observations or make specific adjustments.

4.2. Results of the binary logit model

Table 2 presents the results of the binary Logit model analyzing the adoption of ecological footprint reduction practices by Moroccan SMEs. Regarding H1, coercive pressures (CPRS) have a positive coefficient of 1.3108, highly significant at the 1% level ($p=0.0049$). This result supports the hypothesis that regulations and legal obligations drive companies to adopt ecological practices, demonstrating that these pressures have a substantial effect. For H2, normative pressures (NPRS) have a coefficient of 0.9315, significant at the 5% level ($p=0.0475$), confirming that social expectations and stakeholder influences encourage companies to engage in sustainability. This validates the idea that SMEs respond

positively to societal norms. However, for H3, mimetic pressures (MPRS) have a coefficient of 0.2640, which is not statistically significant ($p=0.5525$). This indicates that imitating sector leaders does not play a significant role in SMEs' decisions to adopt ecological practices, thus not supporting this hypothesis.

Table 2: results of the binary logit model

Dependent Variable: ECOP				
Method: ML - Binary Logit (Newton-Raphson / Marquardt steps)				
Sample: 1 254				
Included observations: 254				
Convergence achieved after 4 iterations				
Coefficient covariance computed using observed Hessian				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	** -0.935832	0.447050	-2.093349	0.0373
CPRS	*** 1.310809	0.461961	2.837488	0.0049
NPRS	** 0.931459	0.467724	1.991472	0.0475
MPRS	0.264002	0.443842	0.594810	0.5525
INAD	* -0.863514	0.448697	-1.924492	0.0554
OPPT	*** 1.304144	0.446912	2.918123	0.0038
CNST	** -1.065608	0.467586	-2.278956	0.0235
FRMS	** 1.059363	0.430766	2.459253	0.0146
EXIN	*** 1.988460	0.614556	3.235605	0.0014

Source: author; ***Significant at 1%; **Significant at 5%; *Significant at 10%.

H4, which focuses on institutional adaptation, is represented by a coefficient of -0.8635 , marginally significant at the 10% level ($p=0.0554$). This result suggests that SMEs adapting their internal processes to meet environmental standards enhance their competitiveness, but this effect may require careful resource management and investment. Concerning H5, opportunities (OPPT) show a positive coefficient of 1.3041 , highly significant at the 1% level ($p=0.0038$), supporting the idea that competitive advantages and access to new markets drive the adoption of sustainable practices, representing a major opportunity lever. For H6, constraints (CNST) have a negative coefficient of -1.0656 , significant at the 5% level ($p=0.0235$), indicating that financial and organizational limitations hinder SMEs from adopting ecological practices. Additionally, the control variable for firm size (FRMS) shows a positive coefficient of 1.0594 , significant at the 5% level ($p=0.0146$), suggesting that larger companies are better equipped to implement sustainable practices. Finally, export intensity (EXIN) has a coefficient of 1.9885 , highly significant at the 1% level ($p=0.0014$), indicating that external influences, such as international market requirements, play a key role in the adoption of ecological practices.

5. Discussion

The study's results reveal that institutional pressures are crucial in driving the adoption of ecological footprint reduction practices among Moroccan SMEs. Coercive pressures, stemming from environmental regulations, exert a significant influence. This can be attributed to the Moroccan government's heightened efforts to strengthen the legislative framework for environmental protection. In response to these demands, Moroccan companies, including SMEs, are compelled to integrate ecological practices, not only to avoid penalties but also to align their operations with the country's environmental ambitions, especially in sensitive sectors like agriculture and tourism. Normative pressures also show a significant impact, indicating that Moroccan SMEs feel a strong influence from

societal expectations and their commercial partners regarding sustainability. This reflects a growing environmental awareness among the Moroccan population and the importance of professional standards in business relations. Moroccan consumers, increasingly aware of environmental issues, favor companies actively engaging in ecological practices. Similarly, business networks and professional associations encourage SMEs to adopt sustainable standards, contributing to a collective drive for environmental protection.

On the other hand, the lack of a significant impact from mimetic pressures indicates that imitating the practices of market leaders is not a key factor for Moroccan SMEs. This may be due to many SMEs operating in sectors where ecological innovation is not seen as a crucial competitive element or because these companies lack the resources to implement the green solutions adopted by larger firms. This highlights a potential need to enhance the dissemination of ecological innovations and promote inspiring models within the local context. Institutional adaptation by SMEs is another critical area. The results suggest that companies proactively adjusting their internal processes to comply with environmental standards are better positioned to navigate an increasingly sustainability-focused business environment. However, this adaptation often requires investments in training, resource management, and technology, which can be a significant challenge, particularly for smaller firms operating with limited margins. Morocco, with its developing entrepreneurial ecosystem, could benefit from support programs aimed at facilitating these transitions for SMEs.

Opportunities arising from the adoption of ecological practices appear to be a significant lever for Moroccan companies. Compliance with environmental standards allows them to access new markets, particularly in Europe, where ecological requirements are stringent, and to establish strategic partnerships with international entities. Furthermore, Morocco's promotion of renewable energy, such as massive investments in solar and wind energy, provides a favorable framework for local businesses to seize these opportunities and strengthen their competitiveness. However, organizational and financial constraints remain notable obstacles. The high cost of the investments required to implement ecological practices is especially challenging for SMEs. This highlights the need for support mechanisms, such as subsidies or tax incentives, which could help these companies overcome financial barriers. In Morocco, initiatives like green financing lines offered by certain financial institutions present viable solutions, but there is a need to enhance and make these options more accessible.

6. Conclusion

This study sheds light on the determinants influencing the adoption of ecological footprint reduction practices by Moroccan SMEs. Based on institutional theory, the results show that coercive pressures, such as stringent regulations imposed by local and international authorities, are critical drivers. SMEs are compelled to comply with environmental standards to avoid sanctions or penalties. Regulatory alignment becomes a strategic imperative, particularly in sectors such as agriculture and tourism, where ecological impact is closely monitored. Normative pressures are equally influential, stemming from the expectations of commercial partners, professional associations, and public opinion, which demand clear commitments to sustainability. This phenomenon is bolstered by a growing awareness among Moroccan consumers, who are increasingly attentive to sustainable practices. Thus, SMEs that invest in green technologies or improve their environmental management benefit from not only a better reputation but also advantageous financial conditions offered by institutions promoting sustainability, such as banks providing green financing.

However, the lack of statistical significance of mimetic pressures highlights a key limitation in the Moroccan context. Unlike large companies that can afford to adopt costly ecological innovations, SMEs seem less influenced by imitating market leaders. This may be due to financial resource constraints, but

also a perception that ecological innovations are not always necessary to remain competitive, particularly in sectors with tight profit margins. Institutional adaptation presents an interesting path for SMEs, though it is perceived as challenging. The findings suggest that companies actively adjusting their internal processes to meet environmental standards can improve their long-term competitiveness. However, these adjustments often require substantial investments in technology, staff training, and supply chain reorganization, which can be difficult for small-sized SMEs. This underscores the importance of support mechanisms, such as training programs or technical assistance, to facilitate a smoother transition to sustainable practices.

The study also reveals that the adoption of ecological practices is viewed as a lever of opportunity for Moroccan SMEs. Access to foreign markets, particularly European ones with high environmental standards, represents a competitive advantage. Additionally, the establishment of new strategic partnerships with international companies, which often prefer to collaborate with environmentally responsible partners, promotes better integration of Moroccan SMEs into global value chains. Moroccan initiatives, such as the development of renewable energy and efforts to attract green investments, further enhance this potential. Despite these benefits, the study emphasizes financial and organizational constraints as major hurdles. The cost of compliance with ecological standards remains prohibitive for many SMEs, especially since the profitability of ecological investments may not be immediate. Furthermore, a lack of qualified personnel and insufficient technical infrastructure hinder SMEs' capacity to adopt sustainable solutions. This highlights the need for increased support from the government and financial institutions, such as subsidies or low-interest loans for ecological innovation.

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