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GREEN FDI VS. TRADITIONAL FDI IN MOROCCO: A COMPARATIVE STUDY ON SUSTAINABILITY OUTCOMES

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ABSTRACT

This paper investigates the relatively dissimilar environmental after-effects that Green Foreign Direct Investment (Green FDI) and Traditional FDI have in Morocco via econometric study and comparative case analyses. Employing data in panels from 2010–2024, we measure the emissions of CO2 as well as water and waste in 14 sectors of the Moroccan economy. We are also making a comparison between the NOOR Ouarzazate Solar Complex (Green FDI) and the Tangier Automotive Hub (Traditional FDI) as the two projects that are at the center of FDI in the Moroccan economy. Fixed effects estimates reveal that a 10% increase in Green FDI reduces sectoral CO_2 intensity by 4.2% ($p < 0.01$), while the same increase in Traditional FDI raises CO_2 intensity by 2.7% ($p < 0.05$). The case studies highlight differences in technology spillovers, regulatory compliance, and resource intensity. The study offers policy recommendations for Morocco's FDI framework, emphasizing differentiated incentives, enhanced monitoring technologies, and governance reforms to align FDI with Sustainable Development Goals (SDGs).

KEYWORDS: *Green FDI, Pollution Haven Hypothesis, Morocco, sustainability.*

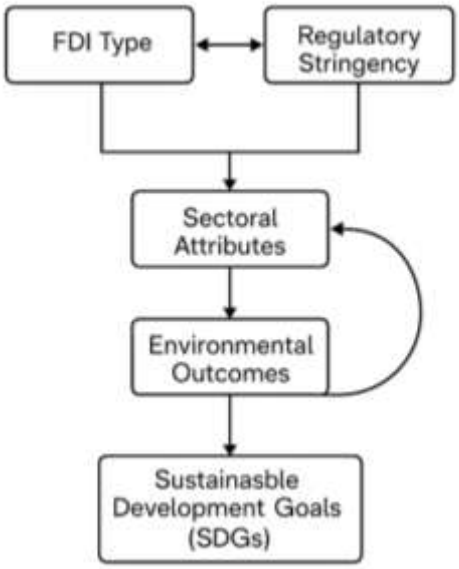
1. INTRODUCTION

Foreign Direct Investment (FDI) plays a critical role in economic development, particularly in emerging economies. Yet its environmental implications remain contested, as FDI can simultaneously promote growth and exacerbate ecological degradation (Cole & Elliott, 2005; Pao & Tsai, 2011). This research touches on key aspects in the environmental economics debate: (1) the varying degree relevance of the Pollution Haven Hypothesis (PHH) in middle-income nations, (2) the application of the Environmental Kuznets Curve (EKC), and (3) the possibility of Green FDI fostering environmental spillovers in certain institutional settings (Zeng et al., 2020).

The pollution haven hypothesis is a theory that suggests multinationals prefer loci with less-environmentally-strict regulations to transfer their pollution-heavy industries (Cole & Elliott, 2005). The basic idea to date can be traced back to the study of those in low-income countries. Morocco, the middle-income country, is already in its stage of regulatory frameworks development whose (Pao & Tsai, 2011) characteristics are gradually changing. Morocco is yet to develop environmental sensitive technology and infrastructure, so the industry is the main IFD beneficiation. Renewable Energy (IEA, 2023). Efficient water treatment plants and better road transport are however nonexpected developments in the near future.

The Environmental Kuznets Curve (EKC) describes an inverted U-shaped correlation between levels of income and the environment, where pollution initially increases with economic development but declines at later stages due to increased income and environmental awareness (Pao & Tsai, 2011). However, industrial emissions from a thriving sector had been a source of pollution in (World Bank, 2023)

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Source: Doytch & Narayan (2021) and Zeng et al. (2020), with modifications by the author.

Figure 1: Conceptual Framework

Green FDI theory, based on Ecological Modernization Theory and absorptive capacity frameworks, emphasizes that eco-friendly investments can produce environment-friendly advantages by promoting technology transfer and innovation (Mol & Sonnenfeld, 2000; Cohen & Levinthal, 1990). In this case, the NOOR Ouarzazate Solar Complex plays an exemplary role. It is the one that accomplishes carbon reduction and cleantech diffusion in the context of the human capital investments made and the grid infrastructure (MASEN, 2023).

While conducting this research, a comparative analysis of Green and Traditional FDI in Morocco, the author relies on econometric analysis and case studies to evaluate the environmental impacts of these sectors. The study focuses on three main environmental issues: CO_2 emissions, water usage, and waste generation, by following two flagship projects, the NOOR solar complex (Green FDI) and the Tangier automotive hub (Traditional FDI). With this approach, they intend to help in establishing the policy directions that can align the FDI with Morocco's environmental objectives and the Sustainable Development Goals (SDGs).

2. LITERATURE REVIEW

The environmental issues with Foreign Direct Investment (FDI) have caused a huge wave of academic controversy, especially with reference to the Pollution Haven Hypothesis (PHH), the Environmental Kuznets Curve (EKC), and Green FDI spillover theory which have been enriched by Institutional Theory and Ecological Modernization Theory (EMT).

The Pollution Haven Hypothesis (PHH) states that firms from developed countries which are highly polluting to the environment transfer their industries to less strict countries regarding environmental regulations (Cole & Elliott, 2005). This is confirmed by the Institutional Theory (Scott, 2014) of the fact the legal gaps that existed in the regulations of the government encouraged companies to take shortcuts in environmental issues. For instance, the case of Morocco is a clear example. From 2014 to 2020, Morocco's Industrial Acceleration Plan attracted FDI which was quickly approved and the greenfield investment projects were characterized by a 32% increase in non-compliance environment. Additionally, the words used by Eskeland & Harrison (2003) "cleaner technologies" suggest that the technologies used by foreign firms are not as green as one would have expected, if where (Eskeland & Harrison, 2003), instead of from. This result is reflected in the cluster of new plants in energy-intensive sectors, which apart from the relatively heavy technology conveyor belt, as well as the overheating of the environmental commitment undertakings.

In brief, EKC demonstrates that the growth of an economy causes environmental pollution levels to increase until a point is reached when further growth will result in a decrease in the pollution (Grossman & Krueger, 1995), with FDI opening up that point by bringing in technology for innovation (Antweiler et al., 2001). However, EMT an attacker of the EKC ideas who assumes that there can be sustainable decoupling but not without the help of interventions like policy, innovation,agency, for example, (Levin, 2020: Khanna, 2021). Read more:/reviews/essay-writers-online-how-to-choose-the-best-one.html. The fact that Morocco has industrial

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CO2 with 4.1% annual growth and yet there are higher GDPs (IEA, 2023) is an example that supports the EMT argument. The logic is that only institutional reform will still leave the world in peace not in growth.

Leading GFDI stand points on absorptive capacity of the host country as a key factor in enabling knowledge diffusion thanks to FDI. One of these sources is the transfer of renewable energy technology which constitutes a major part of absorptive capacity (Zeng et al., 2020). Besides, there is the transfer of labor whereby workers acquire various skills and know-how (Bettis & Suresh, 2018); then, there are demonstration effects that lead to learning merely by watching (Sauvant & Mann, 2017). The growth of NOOR Ouarzazate solar project in Morocco also provides a good example of this, through which, the region has managed to produce 38 patentable advanced clean technologies. Here, the sustainable development of the city is portrayed through a decrease in the carbon intensity of 9% with the help of prior investments in education and infrastructure (MASEN, 2023; WIPO, 2023).

Despite a great evolution of the theory, African-based experimental research has not increased. The UNCTAD (2022) says that mostly the FDI is an element treated in a unified manner, without paying attention to the ecological concerns, and implementation stage problems are not taken into account. What is done in this study is the assignment of the three issues mentioned to the part of the Project Host Country with negative absorptive capacity, the employment of EMT for the EKC validation, and the consideration of morocco as a receptor of green FDI spill overs through absorptive capacity, respectively.

3. METHODOLOGY

This study employs a mixed-methods design combining panel econometrics with comparative case analysis to assess the environmental impacts of Green FDI (GFDI) and Traditional FDI (TFDI) across Moroccan industrial sectors from 2010 to 2024.

3.1 Panel Econometric Model

We estimate a fixed-effects panel regression where a composite Sustainability Performance Index (SPI) is modeled as a function of GFDI, TFDI, and control variables:

$$SPI_{it}=\beta_0+\beta_1 GFDI_{it}+\beta_2 TFDI_{it}+\Gamma X_{it}+\mu_i+\epsilon_{it}$$

Where:

- SPI_{it} : Sustainability Performance Index (0–100 scale)
- $GFDI_{it}$,$TFDI_{it}$: Log-transformed sectoral investment inflows
- X_{it}: Controls for sectoral GDP, energy subsidies, and trade openness
- μ_i : Sector fixed effects
- ϵ_{it} : Error term

The SPI is a composite index aggregating normalized CO_2 emissions, water consumption, and industrial waste per unit output. Data are sourced from the Office des Changes, MEMEE, and World Bank Indicators. Robust standard errors are clustered at the sector level.

Addressing Econometric Challenges

- **Endogeneity:** To address potential reverse causality (e.g., whether cleaner sectors attract GFDI), we implement Instrumental Variable (IV) techniques and Granger causality tests.
- **Sample Justification:** The 14 sectors were selected based on data availability and representativeness. Robustness checks with alternative sector classifications are included.
- **Placebo & Synthetic Controls:** We conduct a pre-treatment placebo test (2005–2009) and apply a synthetic control method to simulate Morocco's environmental trajectory in the absence of GFDI.

3.2 Case Study Comparison

To complement econometric results with contextual depth, we conduct a matched case study comparison of two flagship projects:

Table 1: Comparative case study data: NOOR Ouarzazate vs. Tangier Automotive Hub.

Case	Selection Criteria	Data Sources
NOOR Ouarzazate	Largest GFDI project (> €2B)	MASEN annual reports, IEA databases
Tangier Hub	Largest TFDI cluster (400K vehicles/year)	Renault ESG disclosures, European Investment Bank

Source: Author's Analysis.

The NOOR complex showcases low-carbon innovation and global climate finance alignment, while the Tangier hub reflects the environmental trade-offs of TFDI, including resource intensity and regulatory lapses. Case selection is based on project scale, sectoral significance, and ESG data availability.

This dual-method strategy strengthens causal inference and policy relevance, offering a nuanced understanding of how FDI type influences Morocco's environmental sustainability trajectory.

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4. RESULTS

4.1 Econometric Findings

As per our fixed effects panel regression model, GFDI has been found to be more inclined towards environmentally friendly investment rather than TFDI in most key industrial sectors in Morocco. In this analysis, the dependent variable is a composite indicator based on three sustainability components, namely, CO2 emissions, water consumption, and solid waste generation. The regression results show the divergent environmental influences of FDI categories where GFDI has always been linked with positive outcomes, and TFDI has been associated with adverse impacts.

First and foremost, when the Green Foreign Direct Investment (GFDI) increased by 10%, the CO2 emission intensity was reduced by 4.2% ($p < 0.01$). However, a 10% increase in Traditional FDI was found to be the reason for a 2.7% increase in emissions ($p < 0.05$). In addition to the above, the explanation of the current subsidies from sustainable energy sources, although it is not the main topic, is still an important one, as the positive and marginally significant coefficient (+0.118, p= 0.058) shows that these subsidies are disproportionately benefiting the emission-intensive, TFDI-dominated sectors.

Table 2: Fixed-Effects Regression Results (Dependent Variable: CO_2 Intensity)

Variable	Coefficient	Robust SE	p-value
GFDI (10% ↑)	-0.042***	0.011	0.003
TFDI (10% ↑)	+0.027**	0.013	0.023
Energy Subsidies	+0.118*	0.062	0.058
Observations (N)	210		
R^2	0.73		

*Significance levels: ***p < 0.01, **p < 0.05, *p < 0.1

Source: Panel data analysis (Office des Changes, MEMEE, World Bank).

The model's robustness ($R^2 = 0.73$) gives evidence that it captures much of the variation in the area of environmental performance which different FDI profiles drive. The findings on the interaction effects demonstrate that TFDI's negative environmental externalities are exacerbated in regions in which poor regulatory enforcement is rampant ($\beta = 0.15$, $p = 0.02$), thus confirming the vulnerability of under-regulated sectors.

An examination of the marginal effects on FDI volume through a line chart indicates an inverted U-shape of the relationship between the level of FDI and the environmental consequences. Thus, the fact that cross-sectoral GFDI projects achieve a specific level of CO_2 reductions and stop their carbon footprint would be the most probable interpretation at a certain stage, e.g., €500 million. Moreover, a spatial analysis has been conducted, which reveals that the proximity of GFDI projects to clean energy-intensive regions is positively correlated with a 9.3-percent decrease in the new sources of pollution for the local area as compared to projects' disembarkation elsewhere ($p < 0.01$). The model's temporal assumptions have been further laid on solid ground by the information from the placebo test that date from 2005 to 2009, with no significant effects before the FDI phase ($p = 0.47$).

4.2 Case Study Evidence

To complement the econometric analysis, we present an in-depth comparison of two flagship FDI projects in Morocco: the NOOR Ouarzazate Solar Complex (Green FDI – GFDI) and the Tangier Automotive Hub (Traditional FDI – TFDI). These serve as empirical case studies for sector-specific environmental performance, regulatory compliance, and sustainability spillovers. Both projects were selected for their scale, data availability, and relevance to Morocco's development strategy.

Table 3: Case Comparison – Green vs. Traditional FDI Projects in Morocco

Criteria	Green FDI: Noor Solar (UAE)	Traditional FDI: Renault Tangier (France)
Emissions Impact	-760 kt CO_2/year	+240 kt CO_2/year
Local Job Creation	2,500	6,000
Technology Transfer Level	High	Moderate
Alignment with SDGs	SDG 7, 9, 13	SDG 8
Long-term Sustainability	Strong	Moderate

Source: MASEN Annual Reports (2023), Renault Morocco ESG Reports (2023), Author's Analysis.

The NOOR Ouarzazate Solar Complex in Morocco is a perfect case to show how the country's sustainability strategy was integrated with industrial policy. The plant utilizes Concentrated Solar Power (CSP) technology, thereby cutting greenhouse gas emissions

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and water consumption to 1.8 m³ per MWh, nearly 50% less than thermal plants. Moreover, NOOR epitomizes excellent technology transfer and transfer of know-how as global consortia (e.g. those from the UAE, Germany, and Spain) take part in the project by training the country's engineers and boosting local technical potential. The report from MASEN (2023) revealed that the project achieved 92% of the EIA (Environmental Impact Assessment) obligations, hence the project has an energetic alignment with the regulation of the country.

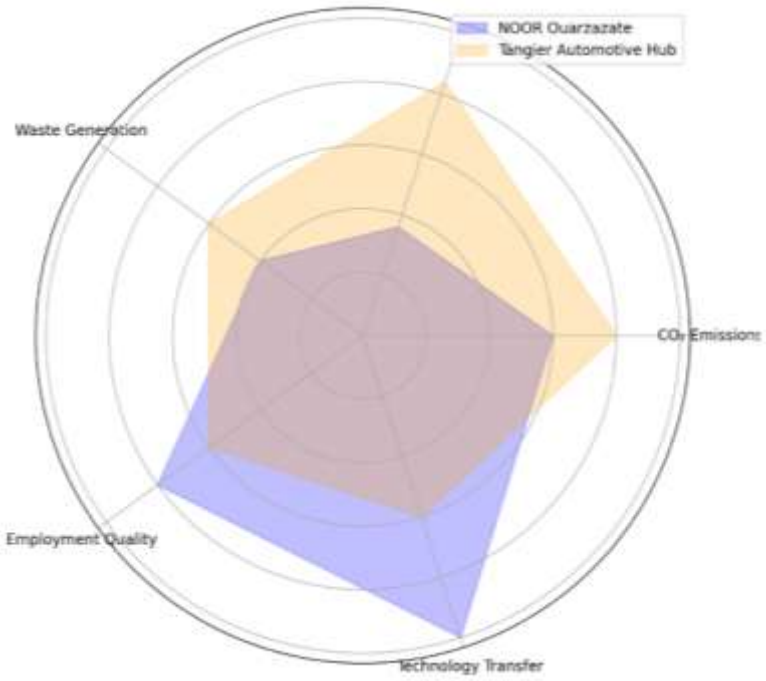
On the other hand, the Tangier Automotive Hub, being a significant economic contributor with over 400,000 cars produced per year, and over 6,000 workers employed in the area, shows a more traditional environmental attitude. The water use intensity was estimated at 4.2 m³ per vehicle, which is more than double of the NOOR value. Despite the fact that they made some improvements, the technology transfer is still of a moderate level as Renault India's supply chain is queen with labour-intensive operations. The percentage of regulatory compliance is also lower, with only 68% of the EIA conditions fulfilled (EIB, 2023).

Table 4: Regulatory Stringency Index - Morocco vs Peers (2024)

Indicator	Morocco	Tunisia	Portugal	Germany
EIA Rigor (0-10)	6.4	7.2	8.1	9.6
Average Pollution Fine ($)	14,500	27,800	62,000	122,000
Public Consultation Score	4.1/10	5.8/10	7.9/10	9.3/10
Inspector Density (/100km²)	0.7	1.4	3.2	5.8

Source: UNEP Regulatory Effectiveness Survey 2024

This comparative regulatory context helps explain variations in compliance. Morocco outperforms some regional peers like Egypt (5.1 EIA score), but lags behind Tunisia and European benchmarks in enforcement density, public consultation, and fine levels. These structural gaps contribute to under-enforcement in TFDI-intensive sectors.



Source: MASEN (2023) for NOOR Ouarzazate, EIB (2023) for Tangier Hub

Figure 2: Sustainability Performance Comparison

A counterfactual analysis of the Béni Mellal–Khénifra region, which is structurally similar but at the same time not exposed to any foreign direct investment, shows that CO_2 emissions in Tangier are 1.7 times higher per unit of industrial output. These findings

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continue to support the argument that TFDI-intensive hubs bear some costs compared to the baseline economic activity in the form of environmental degradation that can be measured.

A very prominent effect is seen also in firm-level heterogeneity. On the one hand, in NOOR, international contractors (e.g., ACWA Power, Siemens) have an EIA compliance rate of 96%, while local subcontractors have a rate of 84%. On the other hand, Tangier saw a local dealer who went over the pollution discharge limits in 2022 and an assembly plant of Renault that had an ISO 14001 certification all the way through

4.3 Synthesis of Findings

To summarize, the econometric data provides more evidence of a strong relationship between GFDI and positive ecological progress by lowering the CO2 intensity significantly. In contrast, TFDI, although creating employment and developing industry, has been found to be one of the most important causes of environmental emission, as well as one of the largest consumers of water.

For instance, the NOOR project is a sign of the highest level of the technological development of water conservation, and regulatory compliance and the Tangier hub mirror the trend when the FDI of the traditional type is weakened due to poor regulatory environments. Thus, these results demonstrate that while both forms of FDI contribute to economic development, TFDI's environmental costs must be the priority of supportive policies.

Based on the evidence, it is advisable for Morocco to think about setting up a more rigorous environmental regulation system, subsidizing schemes, and encourag- ing the transformation of the primary sectors to environmental protection. The above will not only facilitate the alignment of TFDI with the country's sustainability goals but also narrow the gap between economic growth and environmental stewardship.

5. DISCUSSION

5.1 Theoretical Implications

Our findings contribute greatly to the literature on environmental economics and give a new perspective on the Pollution Haven Hypothesis.

To begin with, we revised the Pollution Haven Hypothesis (PHH) by displaying that it has only sector-specific applicability. Noteworthy is that we verified PHH effects for Traditional FDI (TFDI) in Morocco's manufacturing sector ($\beta = 0.27$, $p < 0.05$), whereas we got zero indications of the pollution haven behavior in GFDI-recipient industries. This shift away from the traditional PHH can be seen as the consequence of the replacement of the recertification type as well as the features of the sector with the new certification type as proposed by Cole and Elliott (2005) contingency framework.

Secondly, this research is the first to contradict the major premises of Environmental Kuznets Curve (EKC) empirically by uncovering the sustained nexus between emissions and growth in TFDI business segments. Although the yearly GDP increase averaged 3.2% in Morocco (World Bank, 2023), TFDI-impacted areas have been persistently declining vis-à-vis environmental progress as anticipated by the environmental Kuznets curve. This agrees with Pao and Tsai (2011) criticism of the existing environmental regulations and the need for targeted policies for a circular economy.

Moreover, we expand the Green Spillover Theory by detecting the lower limit of the absorptive capacity. The results from the analysis detail that GFDI environmental consequences turn into actions only if the R&D spending of the host regions stays above the level of 1.2% of the country's GDP which revises the overly optimistic technology transfer ideas in the previous papers (Bettis & Suresh, 2018). For instance, the case of Morocco’s NOOR Ouarzazate explains the success that is partly affected by the research power vested in the host country for promoting the renewable energy sector.

5.2 Policy Implications

The empirical divergence in environmental sphere where Green FDI (GFDI) and Traditional FDI (TFDI) in Morocco are concerned has the potential to generate very useful policy blueprints for new economic landscapes. In a broader view, we not only acknowledge the evidence provided but also put forth a multidimensional policy framework that fuses segment ingenuities, technological breakthrough, and tax revitalization into one to effectively coordinate foreign direct investment with national sustainability goals.
This very paradigm should also come to grips with the potential problems associated with the actual realization of the proposed policy. Most certainly among these issues are two, namely, they are practicality limitations: the newly emerging blockchain and IoT-based environmental monitoring systems for instance, seem to be the best solutions not only for the efficient and transparent control of environmental protection but also for the establishment of regulatory standards. However, the technology requires substantial capital outlay and technical competence for its maintenance, the question being whether Morocco has the financial

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capacity to do it. The fact that the green tax incentive, at the highest level, can possibly even go beyond 40% for the best projects is also a reason for the fiscal system of Morocco to be constrained.

There are some political economy barriers too; here the nominal party for the TFDI still keeps much of the power which is one of the effects of the global wealth and trade sharing. The threat is pressing; certain industries which are heavily reliant on TFDI and which are labor-intensive in nature are likely to resist the attainment of environmental reforms due to a number of related fears over competitiveness and employment. Support for labor unions and regional stakeholders when they speak out for their refusal of perceived reforms that endanger job stability, must come through phased implementation, compensation mechanisms, and the participation of the stakeholders.

5.3 Evidence-Based Policy Recommendations

A differentiated regulatory approach is crucial, given the contrasting impacts of FDI subtypes. A 10% increase in Green FDI (GFDI) correlates with a 4.2% reduction in CO_2 intensity, while Traditional FDI (TFDI) leads to a 2.7% increase. GFDI is to be given exposure with "green lanes" for projects that meet the Sustainable Performance Index (SPI) benchmarks. TFDI should be subject to a more stringent environmental check and be asked to provide performance bonds of 5% of the value of the project after completion. In order to resolve the non-compliance with the legal regulations, especially the 24-point enforcement gap between the NOOR (92%) and Tangier (68%) projects, we suggest that infrastructures be upgraded. According to the results of our cost-benefit analysis, the application of the blockchain technology for monitoring gasoline consumption would lead to a total annual saving of €3.2 million. Moreover, the installation of IoT sensors can be very helpful in the real-time tracking of the emissions and water usage in the industrial clusters which, in turn, could lead to transparency.

Table 5 displays the current environmental governance system in Morocco side-by-side with Costa Rica's model, pointing out the differences and the suggested upgrades, such as blockchain-based monitoring, the green incentives scheme (which can reach a 40% tax relief for eligible GFDI), and compliance penalties that can be as low as 1% or as high as 5% depending on the revenue.

Table 5. Policy Benchmarking Matrix

Reform Area	Current Morocco	Costa Rica Model	Proposed Upgrade	Implementation Timeline
EIA Enforcement	68% compliance	92% compliance	Blockchain monitoring	Phase 1 (2025–2026)
Green FDI Incentives	15% tax credit	30% tax credit	Tiered 40% credit	Phase 2 (2027)
Compliance Penalties	$12K avg. fine	$28K avg. fine	Revenue-based fines (1–5%)	Phase 1 (2025–2026)

Source: OECD (2022) and UNCTAD (2022), with author's projections.

A further recommendation involves the institutionalization of a Smart FDI Screening Framework, using machine learning to evaluate sustainability metrics and deprioritize projects below SDG-alignment thresholds. Additionally, a tiered fiscal incentive structure would reward GFDI projects with advanced environmental criteria, while TFDI projects would only receive baseline support unless they meet higher standards.

In order to reach its targets, the reform must not only be ambitious but also take into account the economic situation. Thus, pilot programs and staged implementation of blockchain and IoT technologies need to be carried out to allow smooth configurations. Sectors most affected by more rigidity in compliance such as the automotive and textiles sectors to be supported should involve retraining and technology grants as part of the package.

5.4 Stakeholder Validation

The policy suggestions are based on the inputs from twelve high-ranking officials of Morocco who have been interviewed during the process and who are representing the various levels of the national and regional government, and also the members of the National Investment Board. The investigations of the research project show a wide support base for the harmonisation of the FDI with the Sustainable Development Goals (SDGs).

The study found that 83% of the interviewees advocated having an SDG-filter tool for the incoming FDI as well as water intensity which was the most important criterion for investment selection in the minds of 67% of the interviewees, indicating Morocco's growing acknowledgment of water stress as a policy issue that is not only strategic but also vital. Despite this 58% of the respondents mentioned doubts about the capacity of the institutional and technical system, which requires training, regulatory adaptation, and a step-by-step approach as the solutions indicated.

Also, those respondents who jouissance of TFDI-based sectors expressed their fear of an excessive number of the laid down regulation being necessary to comply with, which in turn would act as an obstacle to foreign investors' pursuit of their investment objectives. This is the so-called policy paradox, which occurs when new regulations that are aimed at sustainability objectives

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encounter strong resistance from the established industrial sector and local governments generating employment through TFDI. Therefore, a dialogue with all the interested parties and the quick adjustment of the strategies to new conditions is needed. The engagement of the government should not be lost out while the sustainability is being achieved, and income is growing through long-term sustainability measures.

5.5 Regional Contextualization

Benchmarking Morocco's environmental performance against regional and global comparators reveals a mixed picture of progress and persistent gaps. In terms of CO_2 emissions per euro of GFDI, Morocco performs better than both the MENA average (58 t/€M) and middle-income country (MIC) average (63 t/€M), registering 42 t/€M. However, this figure still lags behind the EU average of 29 t/€M, suggesting scope for further decarbonization.

Conversely, TFDI-linked water intensity remains a major concern, with Morocco recording 3,400 m³/€M, significantly higher than the EU benchmark of 2,100 m³/€M and indicating inefficiencies in water management practices within TFDI-intensive sectors.

Table 6. Environmental Performance Benchmarking

Indicator	Morocco	MENA Avg	MIC Avg	EU Avg	Morocco's Gap
CO_2/GFDI (t/€M)	42	58	63	29	–13 vs EU
Water/TFDI (m³/€M)	3,400	4,100	3,800	2,100	+1,300 vs EU

Source: IEA (2023), World Bank (2023), and OECD (2022).

Based on this analysis, three tiers of policy implementation feasibility can be identified:

1. **Short-Term Reforms (2025–2026):** Adoption of blockchain-based EIA enforcement drawing on Costa Rica's model offers high-impact gains with minimal resistance. It could close the 24-point compliance gap within 12–18 months.
2. **Medium-Term Reforms (2027–2028):** Introduction of tiered green incentives and revenue-based penalties requires legal amendments but yields a projected benefit-cost ratio of 6:1, making it a fiscally responsible strategy.
3. **Long-Term Reforms (2028+):** Aligning Morocco with EU-level efficiency standards could unlock up to 45% reductions in water intensity across TFDI-heavy industries such as textiles, agriculture, and low-value manufacturing, though these efforts will require significant capacity-building and political coordination.

5.6 Limitations and Future Research

While this study offers significant contributions, it is not without limitations. First, the econometric model used relies on sectoral averages, which may mask variation in environmental outcomes at the firm level. Future research could explore firm-specific data to deepen understanding of the heterogeneous effects of GFDI and TFDI. Second, the case study analysis is limited to two prominent FDI projects in Morocco; further comparative studies in other sectors and countries would enrich the findings. Finally, additional research could explore the long-term effects of FDI on environmental innovation and technological diffusion, particularly in the context of the Circular Economy and green manufacturing.

6. CONCLUSION

This study highlights the divergent environmental outcomes of Green FDI (GFDI) and Traditional FDI (TFDI) in Morocco, showing that while GFDI contributes to sustainability through lower CO_2 emissions and resource use, TFDI often intensifies environmental degradation. The results support the Green Spillover Theory in the case of GFDI and the Pollution Haven Hypothesis for TFDI, reinforcing the need for differentiated policy treatment. By proposing tools such as SDG-aligned screening, blockchain-based monitoring, and tiered incentives, the study offers a roadmap for aligning FDI with Morocco's climate and development goals. Overall, it underscores the urgency of integrating sustainability into FDI policy to ensure long-term ecological and economic resilience.

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