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ENVIRONMENTAL POLICY STRINGENCY AND GREEN MARKET DEVELOPMENT: A REVIEW OF GLOBAL EVIDENCE

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ABSTRACT

The stringency of environmental policy has become an important tool for fostering sustainable development and greening market throughout the world economy. This review paper is intended to combine the existing literature on EPS and the development of a green market, focusing on green innovation, renewable energy usage, and sustainable industrial routines. Applying a systematic and thematic review method, the paper reviews seminal contributions in the fields of environmental economics, energy policy and sustainable research to analyze how policy-led market transitions are understood in these research domains. The review suggests that strong environmental regulations are important for promoting environmental innovation, renewable energy diffusion, and environmentally sustainable manufacturing. In addition, environmental policy regimes can foster green market development indirectly through innovation incentives, regulatory schemes, and complementary policy tools. Nevertheless, the degree of influence of environmental policy stringency on the environmental quality is different in different nations because of variation in their institutional quality, technological capability, and regulatory enforcement. Overall, the study concludes that well-designed and balanced environmental policies are essential for fostering green market expansion and long-term sustainable economic growth. The paper also identifies key research gaps, including the need for integrated measurement of green market development and more comparative cross-country analyses, thereby offering important implications for policymakers and future research.

KEYWORDS: Policy Stringency, Green Markets, Green Innovation, Renewable Energy, Sustainability

1. INTRODUCTION

Intensifying questions related to climate change, environmental damage, and sustainable growth of the economy have forced the governments around the world to adopt comprehensive measures related to environmental control and management. In this regard, a stringent environmental policy (environmental policy stringency, EPS) has attracted considerable attention in the literature as an important policy tool affecting green innovation, clean technology diffusion and energy market transformation (Galeotti et al., 2020). EPS, is a measure of the stringency of environmental policy based on the intensity of regulatory and economic instrument pressure on environmentally damaging activities and the promotion of environmentally friendly activities.

Discussions on environmental regulation and market formation have long been controversial since Porter Hypothesis that postulates properly designed environmental standards may stimulate innovation leading to improved environmental and economic performance instead of only imposing compliance costs on firms (Porter & van der Linde, 1995; Wang et al., 2019). Further empirical and review literature indicates that EPS such as green innovation, clean technology take-up and renewable energy market growth may be affected by environmental policy stringency but with the effects on these variables differing or opposed across institutional or economic settings (Eugster, 2023; Mihai et al., 2023).

The green market, including renewable energy markets, green technologies and sustainable investments, has been growing significantly within the past twenty years, supported by policy measures on the supply and demand side such as carbon pricing or renewable subsidies as well as through direct or indirect fiscal or tax support (Groba, 2013; Wolde-Rufael et al., 2021). These policy instruments enable investors to sell their pollution rights, thereby creating market incentives for investments in clean technologies, and provide direct technological support and mandate-related market creation for environmental friendly production. Nevertheless the impact of policy stringency might be moderated by regulatory quality, technological capacity, market maturity, etc. across countries (Kongkuah et al., 2025).

Although there are an increasing number of empirical studies, literature on the relationship between environmental policy stringency and green market development is still fragmented and has yielded inconclusive results. Some research has shown positive impacts of stringent policies on clean inventive and clean energy penetration, however such good results may be non-linear or context specific or strongly influenced by policy design and strength of

institution (Mashkhurbek et al., 2025; Mihai et al., 2023). In addition, policy–market relations are additionally complicated by the variance between developed and emerging markets, as well as differences in governance, infrastructure, and capacity to carry out.

Hence, a systematic review of the world-literature evidence is called for to bring together fragmented results and provide more clear conceptual guidance on the ways in which stringency of environmental policies could foster the green market development. This overview paper entitled aim of is to critically review previous contributions and synthesize theoretical and empirical findings in order to explain why, how, to what extent and under which conditions the relationship between EPS and GMD differs in alternative revenue frameworks.

2. Research Objectives

This review seeks to analyze systematic reviews on regional and global scale about environmental policy stringency and green market development based on the available literature. Specific objectives of this research are as follows:

RO1: To review and synthesize the literature on policy stringency in the environmental context and its promotion of sustainable and green market development.

RO2: For the purpose of analyzing the effects of environmental policies on green technology innovation, clean energy avoidance, and environmentally sustainable market growth.

RO3: To provide a quantification analysis of main channels through which EPS affects green market penetration under different economic conditions.

RO4: To test whether these results differ in developed and developing countries.

RO5: To develop a conceptual model in order to identify possible avenues for further research concerning environmental policy and green market development.

2.2 Research Questions

Considering the objectives and the related literature, the current survey is driven by the following RQs:

RQ1: What is known from the current global literature on the effect of environmental policy stringency on green market formation?

RQ2: What are the channels through which environmental policy promotes green innovation, renewable energy use, and sustainable markets growth?

RQ3: Does the Effect of EPS on the Economies of Developed and Emerging Differ?

RQ4: What are the key future research gaps and directions in the literature on environmental policy and green market development?

3. Review Methodology

3.1 Research Design

The current study employs a structured qualitative review design aiming to integrate the worldwide literature on environmental policy stringency and green market formation. Because this article's goal is not to empirically test but to critically synthesize previous literature, the review of the literature is regarded as suitable and academically legitimate. This research adopts a systematic and thematic review approach, with the purpose of critically reviewing the previous research works in areas of environmental policy, green innovation, renewable energy adoption, and sustainable market development.

3.2 Data Sources and Literature Selection

The literature for this review was collected from recognized and credible academic databases to ensure the reliability, validity, and academic rigor of the study. Major sources include Google Scholar, Scopus-indexed journals, ScienceDirect, Springer, and other peer-reviewed academic publications. These databases were selected due to their wide coverage of high-quality research in environmental economics, sustainability, energy policy, and green market studies.

Priority was given to peer-reviewed journal articles, review papers, and policy-oriented empirical studies with strong academic relevance to environmental policy stringency and green market outcomes. Highly cited and recent studies were particularly emphasized to capture contemporary developments in the field.

3.3 Search Strategy and Keywords

A systematic keyword-based search strategy was employed to identify relevant literature. The primary keywords used in the search process included:

"Environmental Policy Stringency,"

"Green Market Development,"

"Green Innovation,"

"Renewable Energy Policy,"

"Environmental Regulation," and"Sustainable Market Growth."

These keywords were used both individually and in combination using Boolean operators (AND, OR) to ensure broader and more accurate coverage of relevant studies. The search Focus. The review analyses studies that explicitly addressed the link between environmental policies and green economic or market outcomes at global, regional and national levels

3.4 Inclusion and Exclusion Criteria

Inclusion Criteria:

In order to preserve academic rigor and relevance, the literature underwent a screening process which applied certain inclusion and exclusion criteria. Inclusion Criteria:

- Journal articles and scholarly review papers that have been peer reviewed
- Research concerning environmental policy stringency, green innovation, clean energy and gre n market development.
- Empirical, theoretical and policy-related work that makes an explicit and transparent contribution to the academic literature
- Articles in English published in peer–reviewed scientific journals.

Exclusion Criteria:

- Popular sources such as blogs, editorials, opinion pieces
- Research not focused on environmental policy or outcomes in green markets
- Repeats of studies and poor-quality or non-trustworthy publications
- Relevant that has no conceptual or empirical relationship to the theme of investigation

This selection procedure maintained that the studies checked in the end were relevant, trustworthy, and scholastically agreeable.

3.5 Method of Analysis

The reviews were subjected to a thematic synthesis. Using this approach, the reviewed researches were analyzed methodically across different dimensions, the themes among them were separated into be categorized as environmental policy stringency, green innovation, renewable energy development, policy instruments, and sustainable market development. This thematic grouping allowed a structured comparison of the results between studies and facilitated the identification of prevalent patterns, divergences, theoretical connections, and gaps in the research literature.

Instead of a simple descriptive overview, the analysis has been integrated critically with theoretical and empirical contributions in a way that enables a holistic view of the environmental policy stringency effect on green market development in diverse economic and institutional settings. This synthesis adds conceptual depth and academic rigor to the review.

4. Review of Literature

4.1 Environmental Policy Stringency and Green Innovation

The link between environment policies stringency and green innovation has been extensively studied in the recent literature in environmental economics and sustainable development. Accumulating evidence suggests that strict environmental regulation may promote innovation by forcing firms to become more environmentally friendly and by motivating them to invest in environment sustainable R&D. For example, Eugster (2023) shows that clean innovation is strongly increased by climate and environmental policies across countries with effects becoming apparent after few years of policy adoption. This is in line with the claim that the regulatory pressure can stimulate technological change rather than just create compliance costs. Likewise Maghyereh et al. (2024) brought up the politico-economic complex environment for green innovation during the energy transition investment era, noting that tightening policy regime can signal a rechanneling of financial and technological source into more sustainable sectors. However, the relationship is not always positive. Mashkhurbek et al. (2025) found that the relationship between the degree of environmental policy stringency and green innovation is inverted U-shaped, implying that the moderate intensity of the policy can promote the green innovation, but too much regulatory burden may impede the innovation activities.

The Porter Hypothesis also provides a theoretical background for explaining this relation. Empirical studies have shown that good environmental regulation can promote green productivity and technological advancement, especially in industries with high clean innovation capacity (Wang et al., 2019).This means appropriate strictness of environmental policy can lead to innovation driven greening of market transformation.

4.2 Environmental Policy Stringency and Renewable Energy Market Development

The tightness of environmental regulation is a fundamental agent for shaping the development of renewable energy market and the sustainable energy transition. Several empirical studies reveal that the adoption of renewable energy and its market expansion is affected by some policy tools as carbon pricing, renewable energy subsidies and emission regulations. Fox (2022) also suggested alignment of renewable energy policies, environmental policy stringency, and climate technologies as a positive indicator of environmental sustainability for the OECD countries.

Moreover, Kongkuah and Alessa, (2025) found a particular global evidence that impact of renewable energy development on reducing carbon intensity is robust especially in the case

of the countries with sound regulatory quality and effective policy regimes. They also concluded that good quality of institutions positively moderates influence of policy stringency in renewable energy markets. Similarly, mild increases in environmental policy stringency also seem to have large positive effects on renewable energy production and growth of the economy, but the latter would be very dependent on a country's level of economic development (Lee et al. 2023).

Codron-based and policy signaling research also argue in favor of the importance of integrated policy Package. Radpour et al. (2021) showed that the combined use of carbonpricing, renewable energy support and coal phase-out measures stronglyaccelerate the growth of renewable energy share and reduction of greenhouse gasengrossions in the long-run. These results imply that environmental policy stringency is more effective if it is implemented together with other policies.

4.3 Policy Instruments and Green Market Mechanisms

The literature shows that various environmental policy instruments differently influence the development of green markets. Market-based instruments such as carbon pricing and environmental taxes are usually considered to be more efficient instruments as compared to the traditional 'command-and-control' instruments. Mihai et al. (2023) indicated that market-based and technology-based environmental policies have a positive impact on reducing greenhouse gas emissions and on increasing renewable energy use in OECD countries.

Likewise, Ma et al. (2024) studied the interplay of the carbon emission trading system and renewable energy policy, and demonstrated that consistent policy arrangement among these two spillover effects can contribute to the sustainable development of electricity markets. Arjmand et al. (2024) recognized the effectiveness of carbon pricing policies over the long term for decarbonizing, and reshaping energy systems. In a similar vein, more stringent environmental regulation has been found to bolster countries' specialization in environmental goods, contributing to the growth of green markets through trade and industry development (Sauvage, 2014).

4.4 Institutional and Regional Differences in Policy Effectiveness

The stringency effect in environmental policies is known to be country-specific, dependent on the quality of institutions, governance, and technological capabilities. Mihai et al. (2023) demonstrated that policy stringency leads to more positive environmental and market results in OECD nations where regulations are more mature. Conversely, developing countries are

unable to immediately comply with environmental regulations, because they are riddled with enforcement problems.

Lan (2013) also pointed out that the human and institutional factors are critical through which environmental regulations affect eco-firm development and sustainable industrial growth. Like Marino et al. (2022) at the organization level: firm characteristics and capabilities to innovate shapes how firms respond to environmental policy pressures. The results imply that policy stringency is not enough itself, institutional and economic conditions to support actualizing green markets are required.

4.5 Measurement Issues and Research Gaps in Existing Literature

Although the number of empirical studies is increasing, there are still a few gaps in the literature on environmental policy stringency and green market development. A methodological challenge concerns the measurement of the environmental policy stringency itself. Galeotti et al. (2020) found that heterogeneous/unsystematic EPS indices across countries prevent a sound policy assessment and cross-country comparison.

In addition, the majority of the existing literature chiefly concentrates on emissions reduction, renewable energy usage or green innovation individually, rather than considering the development of green market as an end result. Wolde-Rufael and Mulat-Weldemeskel (2021) emphasized the nonlinear effect of environmental policy stringency on the environment in developing countries, revealing that the effect of policy is contingent on economic structure and policy design. And Bertram et al. (2015) argued that integrated policy packages (carbon pricing + technology support + energy policies) outperform single policies to reach far-term sustainability objectives.

In general, the literature suggests that environmental policy stringency is an important driver for green innovation and renewable energy markets, but environmental policy stringency is more or less effective depending on the policy design, the institutional quality and other complementary policies. Nevertheless, a holistic synthesis focusing on a connection between environmental policy stringency and green market development within the scope of a multitude of different economic situations and contexts is much overlooked, hence the motivation for performing a high order and integrative review**.**

5. Theoretical Framework

5.1 Theoretical Foundation of Environmental Policy and Green Market Development

Environmental policy stringency and the development of the green market can be explained in terms of environmental economics and sustainable development from various theoretical

viewpoints. There is a stream of theoretical literature that is particularly influential among them: the Porter Hypothesis is one of most widely accepted and discussed one. It turns traditional wisdom, which was that environmental regulations hurt economic growth, on its head, by asserting that regulatory pressure can actually push companies toward cleaner technologies and more efficient means of production.

Environmental policy stringency, in the case of green market development, acts as an institutional pressure that transforms market and technological incentives. Evidence shows a positive impact of tougher environmental regulations on firms' efforts to develop green technologies and to produce green energy and environmentally friendly products, which is also leading to an increase in green markets (Maghyereh et al., 2024; Fox, 2022). This theoretical connection implies that policy-driven innovation is the important institution at the heart of the link between environmental regulation and sustainable-market transforming.

5.2 Policy-Induced Innovation Theory

Another relevant theoretical lens is the “policy-induced innovation” concept that described the interaction between the policy system and the innovation system in shaping the pace and direction of technological development and of innovation behavior more broadly. From this angle, environmental regulations establish economic motives and coercive regulation for enterprises to research and apply clean production technologies. The empirical stuff backs up this contention, finding that the stringency of environmental policies has a positive effect on clean innovation and sustainable finance in energy transition-related industries (Eugster, 2023; Wang et al., 2019).

In addition, technological progress caused by environmental regulation leads to a long-term structural change of industry in markets, especially clean energy and green industry. Radpour et al. (2021) pointed out that integrated environmental regulations (carbon pricing and renewable energy subsidies) accelerate technological diffusion and increase the share of renewables in the energy portfolio. From this theoretical perspective, technological innovation plays an intermediary role for environment policy stringency and green market development.

5.3 Institutional Theory and Policy Effectiveness

The institutional theory also accounts well for differences in policy effectiveness between nations. In this view, the effect of environmental policy stringency is conditioned by the quality of institutions, mechanisms of governance, and enforcement of regulations. Typically, institutional theory interprets the effect of policy severity for the environment as improving

market and env-url outcomes for countries with a high degree of institutional quality, but not for countries with low institutional quality (Mihai et al., 2023; Lan, 2013).

In addition, Institution support such as environmental governance, financial development and technological infrastructure significantly contribute to green market growth. Marino et al. (2022)Corporate chap1 ter1 capabilities and institutional diversity shape the diffusion of green technology- and environment-sust people practice. Thus, when it is not accompanied by effective institutional support mechanisms, the rigour of environmental policy alone may not suffice to encourage growth in green markets.

5.4 Integrated Conceptual Link between Policy Stringency and Green Markets

In the light of theoretical and empirical literature, EPI can be considered as a major exogenous determinant of the green market development with effects on green innovation, renewable energy use and sustainable industrial restructuring among others. Galeotti et al. (2020) underlined that policy stringency indices contribute to the analysis of the competitiveness of environmental regulations in shaping countries' innovation and energy efficiency. As well Bertram et al. (2015) pointed out, in an integrated policy mix, the effectiveness in fostering sustainable economic transformation of carbon pricing is enhanced by technology support and regulatory instruments.

Therefore, the review's theoretical lens would lead one to anticipate that EPS influences the development of the green market directly and indirectly via the mediating mechanisms of innovation, institutional support, and policy design. This holistic viewpoint offers a solid foundation for analyzing how environmental policies contribute to sustainable market growth at the worldwide scale.

6. Conceptual Framework

Based on the synthesis of existing literature on environmental policy stringency, green innovation, and sustainable market development, a conceptual framework is developed to explain the relationship between environmental policy stringency and green market development.

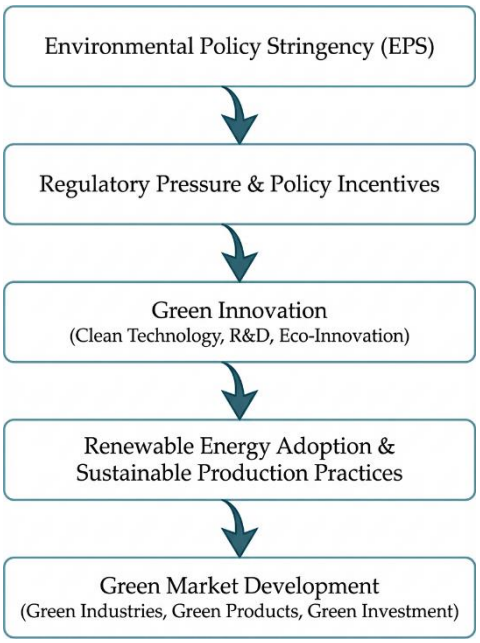

Figure 1: Conceptual Framework Linking Environmental Policy Stringency and Green Market Development.

Source: Author's compilation based on reviewed literature (Galeotti et al., 2020; Maghyereh et al., 2024; Fox, 2022).

The Theoretical Framework/Mechanism depicted in Figure 1 shows the hypothesed effect of environmental policy stringency on the development of a green market. Environmental policy stringency is the main double external and internal policy instrument through which firms and industries are subject to regulatory pressure and policy support. Those supervisory procedures promote the implementation of green innovation, clean technology as well as eco-friendly production methods. Prior literature proposes that stringent environmental policies have a positive impact on green innovation and technology progress, which lead to the increase of renewable energy and sustainable industrial practices, active industries, (Maghyereh et al., 2024; Eugster, 2023).

In addition, the model informs us that green innovation and renewable energy are the two most important mediators between environmental policy stringency and green market development. The expansion of green sectors and products and sustainable financing is highly influenced by innovation-driven policy frameworks and enabling regulatory environments (Fox, 2022; Galeotti et al., 2020). Hence, the model suggests a coherent explanation for the role of environmental policies in enabling sustainable market diffusion on a global scale.

6.1 Moderating Factors in the EPS–Green Market Relationship

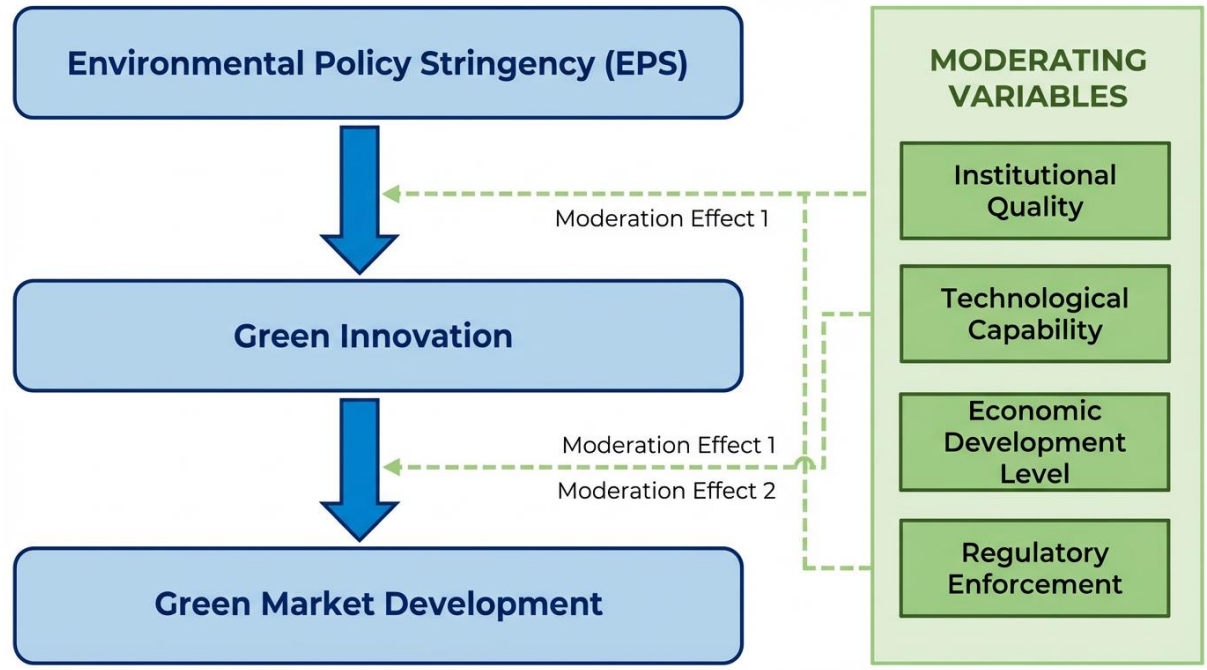

Figure 2: Moderated Conceptual Framework of Environmental Policy Stringency and Green Market Development.

Source: Author's compilation based on reviewed literature (Galeotti et al., 2020; Mihai et al., 2023; Maghyereh et al., 2024; Radpour et al., 2021).

Figure 2 proposes an extension of the conceptual framework by including moderating factors which may enhance or inhibit the impact of environmental policy stringency. The literature suggest that the quality of institutions, the technological capability and the level of enforcement of regulations and of economic development determine the extent by which environmental policies result in green market outcomes (Mihai et al., 2023; Lan, 2013).

Stricter environmental policies in developed countries with stable institutions and well-established technological infrastructure are more likely to have significantly positive effects on green innovation and green sustainable growth. On the other hand, the pace of green market growth may be relatively slow in developing countries, where they have to face with policy execution difficulties, shortage of capital and technological capability. Thus, the effect of E PS on GMD is not direct, but depends on institutional and economic factors. 7. Discussion and Synthesis of Literature

7.1 Synthesis of Key Findings

Taken together, the reviewed literature confirms that the stringency of environmental policy significantly affects the path of green innovation and, as a consequence of green innovation, the path of green energy, and the final path of green market development. There is consensus among most of the research community that well designed environmental regulations promote technological innovation and sustainable industrial evolution instead of causing regulatory burden. This is consistent with the innovation based view of environmental regulation moderating the relationship between policy pressure and eco-innovation which also suggests that policy pressure may generate cleaner production practices (Eugster, 2023; Maghyereh et al., 2024).

A common theme in the literature is that the stringency of environmental policy encourages green innovation as a key mechanism in the transmission of policy and market development. Empirical results indicate that more stringent environmental regulations promote development and investment in clean technologies and environmentally friendly R&D (research and development), which in turn induce long run structural changes toward green industries (Wang et al., 2019; Radpour et al., 2021). This suggests policy driven innovation is important for the expanding green market.

In addition, the review underscores the close relationship between environmental policy structure and the development of the renewable energy market. Review of literature also shows a strong link between environmental policy regimes and the renewable energy market growth. Literature indicates that policy instruments including carbon pricing, environmental taxation and renewable energy support have a significant impact on sustainable energy developments and market growth (Fox, 2022; Kongkuah & Alessa, 2025). These mechanisms also reduce the risk faced by investors and promote the growth of green industries, and produce green products.

7.2 Role of Policy Design and Policy Instruments

Another key finding from the literature is that the “stringency” (how tight or loose the policy is) of the environmental policy needs to be considered in conjunction with other aspects of the policy design, including the instrument types. Market-based instruments such as carbon pricing and emission trading systems are found to be more effective in incentivizing green innovation and sustaining markets than traditional command and control regulations (Mihai et al., 2023; Ma et al., 2024). Bundles of policies and integrated policy mixes, which include

regulation but also extend to technology support schemes and financial incentives, are more effective in generating environmental and economic benefits (Bertram et al., 2015).

Coordinated environmental and energy policy has also been found to speed the diffusion of new renewable energy technologies and improve the sustainability of electricity markets. This is clear evidence that the stringency of environmental policyworks best when it is underpinned by complementary policy instruments rather than being a standalone regulatory measure.

7.3 Differences between Developed and Emerging Economies

The synthesis of worldwide data points towards significant differences in the effects of strict environmental policies between developed and developing countries. Developed countries with well-established institutional infrastructure and high capacity of technology and regulation enforcement are more likely to have positive effect from tough environmental policies. In enlightenment, green growth in the emerging economies is prone to be delayed because of the barriers of policy implementation, alms to finance and constraints of technology (Lan, 2013; Mihai et al., 2023).

Furthermore, the quality of institutions moderates the efficacy of environmental policy market-based measures. A better-governed country or one with more policy stability is more capable of turning regulatory pressure into innovation and market-based sustainability. This indicates that a stringent environmental policy is not sufficient in itself, but good institutional and economic conditions are needed to sustain long term green market growth.

7.4 Critical Evaluation of Existing Literature

Despite the strong evidence for a positive effect of stringency of environmental policy found in the literature, a few studies also suggest non-linear or context-specific impacts. For example, too much regulatory burden can raise the cost of compliance and weaken firms' competitiveness especially in countries where the institutional support is relatively low. This implies a nonlinearity in the relationship between policy stringency and the development of green markets, contingent on the type and degree of stringency in regulatory frameworks (Mashkhurbek et al., 2025).

Another limitation noted in the literature is that there is no common conceptual basis for measuring green market development. There is a plethora of studies considering emissions abatement, greening of innovation or renewable energy independently, with no effort to combine these aspects within a coherent market based approach (Galeotti et al., 2020).

Therefore, the literature is still scattered and does not provide an integrative synthesis aligning the stringency of environmental policy with green market development.

7.5 Implications for Theory and Policy

Theoretically, the findings in this line of review study are consistent with the Porter Hypothesis and policy induced-innovation theory which highlight the significance of environmental regulations as a driver for innovation and a sustainable economic restructuring. The synthesis indicates that environmental policy stringency can be a powerful driver for the growth of green markets, particularly when such policies are flexible, supportive of innovation, and embedded in a strong institutional framework.

From a policy perspective, governments should be relieved that promoting innovation and adoption of renewable energy sources while avoiding overly burdensome environmental regulations on firms is not a conflicting mandate. The evidence suggests that integrated policy strategies including carbon pricing, technological incentives, and regulatory standards tend to be more successful in nurturing a sustainable market than isolated policy instruments. Hence, to foster the effectiveness of environmental policy stringency on the green market development, policy implications are discussed for strengthening a holistic and contextualized approach.

8. CONCLUSION

This paper reviews the links between environmental policy stringency and green market development through an integration of the related global research. The general result of the reviewed studies is that EPS has a significant positive effect on greening innovation activities, renewable energy investment and the greening of markets. It is not that they can only add costs, but well designed environmental policies also create incentives for firms and industries to invest in cleaner technologies and more environmentally sustainable practices (Eugster, 2023; Maghyereh et al., 2024).

The literature consistently emphasizes that environmental policy stringency at least positively affects green market development directly, if not indirectly. An important transmission channel is green innovation since more stringent environmental regulations stimulate research and development on clean technologies and environmentally friendly production processes (Wang et al., 2019; Radpour et al., 2021). Also policy measures like carbon taxation, renewables subsidies and emission standards have been demonstrated to promote renewable energy development and sustainable industry progress which are significant aspect of green market growth (Fox, 2022; Kongkuah & Alessa, 2025).

Nevertheless, the literature results also indicate that the impact of stringency of environmental policies does not have the same intensity for the group of countries. Advanced economies with well-developed institutions, high levels of technology, and an effective system of regulatory enforcement are more likely to see beneficial effects of tight environmental regulations. Compared to this, developing countries are challenged by barriers to application, they have financial constraints and institutional drawbacks, which potentially could delay the effects of environmental regulations on growth of green markets (Mihai et al., 2023; Lan, 2013). This implies that the quality of institutions and the type of economic system moderate the effect of eco-policy measure.

It is also worth noting that this analysis demonstrates a positive correlation between stringency of environmental policies and the development of green markets, but the two are non-linear and the context matters. While the impact of stringent rules in fostering innovation and sustainable market development is generally positive, if these rules become overly harsh they may further increase firms' compliance costs and constitute obstacles to the presence of firms – mainly in developing countries. This provides further support to the argument that 'softer' and more flexible policy packages outperform 'harder' and more regulatory ones (Mashkhurbek et al., 2025).

Overall, the generalisation of global evidence appears to be that the positive effect of environmental policy stringency on green market development is largely dependent on the presence of strong innovation policy, institutional capabilities, and other complementary instruments of policies. This paper makes a contribution to the existing literature by offering a holistic and conceptual explanation of the environmental policy effects on green market development in varying economic settings. Synthesizing disparate results, this review provides a more coherent theory- and policy-relevant view of the importance of the stringency of environmental policies in fostering sustainable (and environmentally friendly) market evolution.

9. Future Research Directions

There is an increasing amount of research on the stringency of environmental policies and the associated sustainability implications, yet some important issues remain under-scrutinized and ripe for further investigation. Firstly, further studies are expected to contribute to the advancement of a more contested and holistic conceptualization of greening market development. The existing research predominantly focuses in isolation on the effects of environmental policies on abatement, adoption of renewable energies, or green innovation,

and does not extend to the concept of green market development as a whole (see also Galeotti et al., 2020). Standardising the measurement of would yield more robust results when comparing countries and regions.

Second, the difference in effects of environmental policy stringency between advanced and developing economies needs to be further investigated. The reviewed evidence is that institutional quality, technological capability and regulatory enforcement matter in how effective policies are, but there are relatively few cross-country generalisations of these moderating factors (Mihai et al., 2023; Lan, 2013). Future research may also consider adopting comparative and multi-country perspectives to enhance the capture of contextual differences in policy results.

Thirdly, future research should investigate the nonlinearity and lagged effect of environmental policy stringency on green market development. Indeed, recent literature argues that the impact of policies stringency on innovation and or on its sustainability might be non-linear, suggesting that mild regulation may encourage innovation, severe policy may impose economic burden and thus discourage innovation (Mashkhurbek et al., 2025). Longitudinal research and modeling the policy–market relationship as a dynamic process would facilitate further insights into these complex dynamics.

Also, a direction for future research would be the coupling of policy mix assessment. The literature indicates that environmental policy stringency is more effective when accompanied by supporting policies, such as carbon pricing, renewable energy subsidies, and policies for technology support (Bertram et al., 2015; Radpour et al., 2021). Therefore, future research is suggested to investigate the impact of different policy mixes rather than single-policy implications on the growth of green markets.

Moreover, a greater focus is needed on sectoral research, specializing in green sectors such as renewable energy, green finance, and sustainable manufacturing. Most of the existing studies take a macro-level approach that can mask industry-specific variations in policy responsiveness and market development (Fox, 2022; Maghyereh et al., 2024). Studies at the micro and industry level could yield further insights on how firms and industries adjust to environmental policy stringency.

To conclude, future research is advised to integrate both institutional and behavioral factors, such as governance quality, environmental consciousness, and firm-level flexibility, which presumably better explain the policy–market linkage. The literature indicates that a strong institutional framework and innovation capacity are vital for converting environmental

regulations into sustainable market performance (Marino et al., 2022; Mihai et al., 2023). In other words, cross-disciplinary studies including environmental economics and policy studies as well as sustainability management specifically would be pertinent to deepen the understanding of green market development in relation to stringency of (environmental) policy.

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