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Integration of Climate Change Strategies into Policy and Planning for Regional Development: A Case Study of Greece

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Abstract: Climate change presents a pressing challenge to regional development, impacting economies, environments, and societies across the globe. Europe, with its diverse regions and commitment to sustainability, serves as a unique case study for exploring the integration of climate change strategies into regional policy and planning. The purpose of this study is to analyze the integration of climate change strategies into policy and planning for regional development in Europe, especially in Greece. Data was collected from 270 environmental experts across Greece using a questionnaire. The results highlight the significance of regional economic growth (gross regional product), infrastructure quality, educational attainment, and a conducive business environment as key measures of regional development. Opportunities arising from climate change strategy integration are explored, revealing economic benefits, environmental opportunities, social enhancements, and technological advancements. These opportunities not only mitigate climate change's adverse impacts but also foster innovation, economic growth, and community resilience. Successful integration can position regions as global leaders in sustainability and innovation. Correlation and regression analyses reveal that opportunities for integration and common climate change strategies positively influence regional development, while barriers exhibit a counterintuitive positive relationship. However, several barriers hinder integration efforts, including institutional fragmentation, resource constraints, conflicting political and economic priorities, and insufficient stakeholder engagement. This study sheds light on the intricate relationship between climate change, policy integration, and regional development in Greece. It supports the potential for regions to drive sustainability and innovation while navigating the challenges of climate change, ultimately contributing to a more resilient and prosperous future.

Keywords: climate change strategies; opportunities in integration; barriers to integration; regional development

Citation: Kalogiannidis, S.; Kalfas, D.; Papaevangelou, O.; Chatzitheodoridis, F.; Katsetsiadou, K.-N.; Lekkas, E. Integration of Climate Change Strategies into Policy and Planning for Regional Development: A Case Study of Greece. *Land* **2024**, *13*, 268. https://doi.org/10.3390/land13030268

Academic Editor: Luís Carlos Loures

Received: 28 January 2024
Revised: 12 February 2024
Accepted: 19 February 2024
Published: 21 February 2024

1. Introduction

Regional development is being severely threatened by climate change, which has an effect on social cohesion, environmental sustainability, and economic stability. In order to lessen the effects of climate change, the Intergovernmental Panel on Climate Change (IPCC) has repeatedly stressed the need for swift and decisive action [1]. The impacts of climate change in Europe, such as severe weather, increasing sea levels, and altered precipitation patterns, are significant for infrastructure, agriculture, and public health [2]. There is an urgent need to include climate change solutions in regional planning and policy as the consequences of climate change become more apparent. In order to guarantee that regional

development is resilient, sustainable, and climate change-adaptive, such cooperation is essential. Europe offers a special scenario for researching the incorporation of climate change policies into regional development because of its different areas and dedication to sustainability [3].

Historically, the European Union (EU) has been a pioneer in acknowledging the importance of climate change mitigation and adaptation [4]. The EU's approach has been characterized by setting ambitious targets and developing comprehensive policy frameworks. One of the foundational steps was the adoption of the European Climate Change Program (ECCP) in 2000, which laid the groundwork for integrated climate policies [5–8]. Furthermore, the EU's commitment to the Kyoto Protocol and subsequent Paris Agreement underscored its role as a global leader in climate policy [1]. The evolution of climate change awareness in Europe has also been marked by the recognition of the regional dimension of climate action. The European Union's cohesion policy, aimed at reducing disparities between regions, has increasingly emphasized the integration of climate change strategies into regional development plans [9–11]. This shift acknowledges that the impacts of climate change are not uniform across Europe, and thus, tailored regional strategies are essential for effective mitigation and adaptation [1]. One of the challenges faced by European regions has been the integration of these strategies into existing policy and planning frameworks. While some regions have successfully embedded climate action into their development plans, others have struggled, often due to a lack of resources, expertise, or political will. For instance, regions that are heavily reliant on carbon-intensive industries may find it more challenging to align their economic development objectives with climate change mitigation goals [11–13].

In the fight against climate change, the European Union (EU) has taken the lead, establishing aggressive goals to cut greenhouse gas emissions and advance sustainable development. The region's commitment to becoming the first continent in the world to be climate-neutral by 2050 is shown by the European Green Deal, which was proposed by the European Commission in 2019 [14]. With a focus on everything from transportation to agriculture, this policy framework seeks to restructure the EU economy for a sustainable future while guaranteeing a fair transition for all regions [15,16]. The incorporation of climate change solutions into regional policy and planning is still a challenging task in spite of these comprehensive efforts [17]. Developing plans that are both coherent and successful is hampered by diverse geographical features, varied degrees of economic growth, and divergent stakeholder agendas. In addition, the complexity of the policy-making process stems from the transnational character of climate change, which demands collaboration across national and regional borders [18].

The European Union's policy landscape is marked by its multi-level governance structure, which, while allowing for a degree of flexibility and localization of policy, can also lead to discrepancies and coordination challenges between national and regional policies [19–23]. Furthermore, the urgency and scale of the climate crisis require transformative changes, yet regional policies often reflect incremental rather than transformative approaches. This discrepancy is partly due to the inherent risk aversion within political and planning entities, making them resistant to implementing bold, comprehensive strategies that align with the long-term goals of climate change mitigation and adaptation [24]. While some regions, particularly in Northern and Western Europe, have made considerable progress in integrating climate change strategies into their policy and planning processes, others, especially in Southern and Eastern Europe, lag due to economic, technical, and administrative constraints [19]. Effective integration of climate change strategies requires the participation of a wide array of stakeholders, including the private sector, civil society, and the general public. However, often, there is a disconnect between policy-making and the stakeholders it affects, leading to a lack of ownership and support for the implemented strategies [3]. In light of these challenges, this study seeks to delve deeper into the integration of climate change strategies into regional policy and planning in Europe, especially in Greece. It aims to uncover the underlying factors contributing to the successful or unsuccessful

integration of these strategies and to understand the implications of these integrations on regional development.

1.1. Purpose of the Study

The purpose of this study is to analyze the integration of climate change strategies into policy and planning for regional development in Greece. Understanding how climate strategies are incorporated into policy and planning can reveal insights into the effectiveness of current approaches and highlight areas for improvement.

1.2. Research Objectives

To evaluate the current state of integration of climate change strategies into regional development policies in Greece–Europe.

To identify the challenges and barriers faced by European regions, especially Greece, in implementing climate change strategies towards regional development.

To identify the common climate change strategies that are integrated into regional development policies and their effect on regional development.

1.3. Research Hypotheses

Hypothesis 1 (H1). *There is a significant relationship between opportunities for the integration of climate change strategies into policy and planning and the level of regional development in Greece.*

Hypothesis 2 (H2). *Barriers to the integration of climate change strategies into policy and planning have a negative effect on the level of regional development in Greece.*

Hypothesis 3 (H3). *The integration of climate change strategies into regional policy and planning positively correlates with sustainable regional development outcomes.*

1.4. Significance of the Study

This study holds significance for policymakers, regional planners, and stakeholders involved in regional development. It contributes to the understanding of the integration process of climate change strategies into regional policies, offering insights that can guide effective policy formulation and implementation. The integration of climate change strategies into regional development policy and planning is not merely an environmental imperative but a multifaceted necessity that impacts socio-economic stability, public health, and long-term regional resilience. At the crux of regional development lies the capacity of policymakers and planners to anticipate, mitigate, and adapt to climate-induced challenges. This research underlines the criticality of embedding climate strategies into the fabric of regional planning, echoing the sentiments of seminal works in the field [25,26]. It contributes to the existing literature by providing a nuanced understanding of Europe's efforts, successes, and shortcomings in this regard, serving as a potential blueprint for effective policymaking.

The economic implications of climate change are profound, with regions facing potential losses in productivity, increased disaster recovery costs, and resource scarcity. This study illuminates the economic rationale behind integrated climate strategies, echoing the economic arguments presented by Stern (2007) [27] in his influential review. By showcasing the economic benefits and cost-effectiveness of proactive climate integration, the research provides compelling evidence for policymakers and planners.

Finally, the significance of this research lies in its forward-looking contributions. By identifying best practices, gaps, and barriers in the current integration efforts, the study offers invaluable guidance for future climate strategies, resonating with the recommendations of high-profile reports like those by the IPCC in 2023 [1].

2. Literature Review

2.1. Policy Integration Theory

The integration of policies has become more important when it comes to tackling intricate and diverse concerns such as climate change, particularly when it comes to environmental policymaking. At its core, policy integration means bringing environmental objectives into the policy processes of non-environmental policy sectors at all levels [28]. This concept is predicated on the understanding that, as opposed to being handled in an isolated fashion, environmental challenges must be considered within a bigger policy framework that spans several sectors and levels of government. Policy integration originated with the concept of "environmental policy integration" (EPI), which emerged from the understanding that environmental protection could not be effectively achieved by fragmented measures [29]. Rather, it necessitated the methodical evaluation of environmental goals in all policy areas. As a result of the expansion of EPI's purview to include both sustainability and climate change, the terms "sustainability policy integration" and "climate policy integration" (CPI) have been widely used [1].

Papaspyropoulos et al. (2023) [17] noted that policy integration is a multi-dimensional concept and involves several dimensions, including horizontal integration (across policy sectors), vertical integration (across levels of governance), and temporal integration (over time). Horizontal integration is particularly challenging, as it requires coordination among diverse sectors and often incorporates policy sectors such as transportation, energy, and agriculture [19,21]. Vertical integration, on the other hand, deals with aligning policies at local, regional, national, and international levels, which is essential for addressing global issues like climate change. Temporal integration ensures that policies are consistent over time, providing long-term stability and predictability for stakeholders [30,31].

Institutional frameworks and specialized procedures are necessary for effective policy integration. Di Gregorio et al. (2017) [19] list a number of techniques, including the creation of interministerial committees, the use of integrated policy texts, and the nomination of entities or people that cross boundaries. However, there are frequently obstacles in the way of putting these systems into practice. One of the main problems is institutional fragmentation, in which many governmental sectors and tiers function autonomously with little cooperation or communication [32,33]. Furthermore, the disparities in objectives and interests among stakeholders may impede the process of reaching a consensus that is essential for the development of integrated policies [15]. Important insights into the real-world applications of policy integration may be gained via empirical research. Sebos et al. (2023) [34], for instance, provide a thorough examination of the integration of environmental policies in Europe, stressing both the achievements and obstacles the European Union has encountered in integrating environmental goals into its policies. A different case study by Gyberg and Mobjörk (2021) [35] looks at how climate change is incorporated into Swedish development cooperation strategy, illuminating the difficulties and trade-offs associated with striking a balance between development and climate change goals.

The framework provided by policy integration theory is essential for comprehending and tackling the multi-level and cross-sectoral issues raised by climate change. Policy integration may enhance the coherence, efficacy, and sustainability of solutions to the urgent problem of climate change by encouraging the methodical evaluation of climate goals in all policy domains and levels of governance [3,11,36,37].

2.2. Overview of Climate Change Integration into Regional Policy and Planning

Recent studies have expanded upon this framework, focusing specifically on the integration of climate change strategies [38]. For instance, Ray Biswas and Rahman (2023) [11] highlight the importance of institutional arrangements in facilitating or hindering the integration process. Their research underscores the need for strong political commitment and inter-departmental coordination, echoing earlier findings by Rakibul and Khalid (2014) [39], who emphasize the critical role of political leadership in championing climate change integration.

In the European context, climate change integration has been significantly influenced by the European Union's policies and directives. The IPCC discussed the EU's role in promoting climate policy integration among member states, particularly through the European Climate Change Programme (ECCP) [40]. However, Oliveira et al. (2015) [41] argue that despite these top-down efforts, there remains a considerable gap between policy formulation and implementation at the regional level, largely due to varying capacities and priorities among regions [42]. The disparities in regional capacities are further explored by Barrett (2018) [43], who examines the differing approaches to climate change adaptation and mitigation across European cities. Moreover, it reveals a fragmented landscape, where some regions exhibit comprehensive integration strategies while others lag behind. This is in line with the findings of Shine (2017) [44], who documents the diverse climate change governance landscapes that have emerged, influenced by local political, economic, and social contexts [45].

Moreover, the complexity of integrating climate change strategies into regional development is highlighted by the multi-dimensional impacts of climate change [46]. A study by Gancheva et al. (2020) [47] emphasizes the need for a holistic approach that considers the interplay between environmental, economic, and social factors. Similarly, Snigdha Nautiyal and Klinsky (2022) [48] explore the concept of adaptive capacity, suggesting that regions must not only integrate climate change strategies but also enhance their ability to adapt to unforeseen impacts. Despite these challenges, some regions have made significant progress in integrating climate change strategies. A case in point is the pioneering work of the Nordic countries, as detailed by Hallegatte et al. (2016) [49], who explore the proactive measures taken by these regions in incorporating climate change adaptation into regional planning. Their success provides valuable lessons for other south European regions, highlighting the potential for innovative governance structures and collaborative planning processes [50–53].

2.3. Opportunities for the Integration of Climate Change Strategies

According to Serra et al. (2022) [15], the integration of different climate change strategies into regional development not only addresses the adverse impacts of climate change but also unveils a multitude of opportunities for regions to foster innovation, economic growth, and social welfare. These opportunities can manifest in various forms, ranging from economic revitalization through green industries to enhanced community resilience and global leadership in sustainable practices [54,55]. The shift towards a low-carbon economy presents significant economic opportunities for regions willing to invest in green industries. The development of renewable energy sources, such as wind, solar, and bioenergy, has the potential to create new markets and job opportunities. For instance, regions with favorable geographic conditions can capitalize on these natural advantages to become hubs for renewable energy production [55,56]. The growth of green industries can also stimulate innovation in related sectors, including manufacturing, construction, and services. As highlighted by Sebos et al. (2023) [34], investing in green industries not only addresses environmental challenges but also acts as a catalyst for economic diversification and long-term growth [57].

Integrating climate change strategies into regional planning can significantly enhance community resilience and quality of life. By prioritizing sustainable urban planning, regions can create healthier and more livable environments [58–60]. Initiatives such as expanding green spaces, improving public transportation, and promoting energy-efficient buildings contribute to reduced pollution, lower energy costs, and enhanced public health. These measures not only make regions more attractive to residents and businesses but also increase resilience to climate-related shocks. As emphasized by Blanco et al. (2009) [18], community resilience is a crucial component of sustainable development, underpinning the ability of regions to adapt and thrive in the face of the different elements of climate change [61].

According to Serra et al. (2022) [15], regions that successfully integrate climate change strategies can position themselves as global leaders in sustainability and innovation. By pioneering new technologies and practices, these regions can set benchmarks for others to follow. This leadership role can enhance the region's reputation, attract international investments, and foster collaborations that further drive innovation. Regions can also leverage their experience to influence global climate policy and contribute to the collective effort to mitigate climate change [39,46,62].

Diversifying the energy mix through the integration of renewable energy sources enhances regional energy security. By reducing dependence on imported fossil fuels, regions can shield themselves from volatile energy prices and geopolitical risks [54,63]. Furthermore, the localized nature of renewable energy production, such as solar and wind power, can empower communities and contribute to regional self-sufficiency. As pointed out by Snigdha Nautiyal and Klinsky (2022) [48], the transition to a more sustainable and secure energy system is a pivotal opportunity for regional development in the context of climate change.

According to Nowak et al. (2023) [64], climate change strategies that focus on environmental conservation and sustainable practices can boost regional tourism. By preserving natural landscapes and cultural heritage, regions can attract tourists seeking authentic and eco-friendly experiences. Sustainable tourism not only generates revenue but also promotes cultural exchange and conservation efforts [65]. As Karami et al. (2023) [54] note, sustainable tourism is not only an economic opportunity but also a means to raise awareness about climate change and the importance of preserving the environment.

The Basque Country in Spain is another noteworthy example, particularly for its transition towards a low-carbon economy. The Basque Country's Climate Change Strategy 2050 sets ambitious targets for reducing greenhouse gas emissions and increasing energy efficiency. The strategy is characterized by its integration across different sectors, including industry, transportation, and urban planning [49]. Nowak et al. (2023) praised the region's use of innovative financial instruments and public-private partnerships to support green investments. The Basque Country's experience demonstrates how a clear long-term vision, combined with supportive financial mechanisms, can facilitate the integration of climate change strategies into regional development [64]. Similar conclusions for other European member states are reached by [66] and M. Nowak et al. [67]. The same is the case with cities in China [68].

2.4. Barriers to Integrating Climate Change Strategies into Regional Development Policies

Cimato and Mullan (2010) [46] noted that one of the primary barriers to integrating climate change strategies into regional development policies is institutional fragmentation. The complexity of climate change as an issue means that it intersects with numerous policy areas, from energy and transportation to agriculture and urban planning. This intersectionality requires a coordinated approach across various governmental departments and agencies, which often operate in silos [46,69,70]. Gancheva et al. (2020) [47] examine this challenge, noting that institutional fragmentation can lead to inconsistencies in policy objectives, conflicts between departments, and a lack of coherent strategy. Furthermore, regional governments may have limited autonomy or resources to effectively integrate

climate change strategies into their development plans, as highlighted by Frankel-Reed et al. (2011) [30].

According to Winkler (2023) [32], resource constraints are a significant barrier for many regions attempting to integrate climate change strategies. This includes financial resources, human capital, and technical expertise. Financial constraints can particularly hinder the implementation of climate change initiatives, as many adaptation and mitigation strategies require significant upfront investments [24,28,71]. As Ledda et al. (2020) [28] point out, the lack of financial resources can be especially acute in less affluent regions, which might also be more vulnerable to the impacts of climate change. Additionally, there is often a lack of skilled professionals who understand both the complexities of climate science and the nuances of regional development policy, as discussed by Cittadino et al. (2022) [3].

Closely linked to the lack of resources is the barrier of insufficient knowledge and capacity at the regional level [18,49,54]. Many regional policymakers and stakeholders may not have a deep understanding of climate change, its impacts, and the most effective strategies for integration into development policies. Gyberg and Mobjörk (2021) [35] argue that the technical nature of climate change and the uncertainties associated with its impacts can make it difficult for regional actors to make informed decisions. This is compounded by a lack of capacity in terms of data availability, monitoring, and evaluation systems to track progress and make evidence-based adjustments to policies [72].

According to Lenaerts et al. (2022) [7], political and economic priorities can also act as barriers to integrating climate change strategies. Immediate economic concerns and political pressures often overshadow long-term climate objectives. As a result, short-term economic growth and job creation can take precedence over sustainability and climate resilience, especially in regions facing economic challenges. This is examined by Khan et al. (2023) [38], who discuss the tension between immediate economic needs and long-term climate goals, noting that this can lead to a deprioritization of climate change strategies in regional development plans.

A report by the World Health Organization (2022) [63] noted that a lack of meaningful stakeholder engagement can hinder the integration of climate change strategies. Stakeholders, including local communities, businesses, and civil society organizations, play a crucial role in the successful implementation of climate change policies. However, the OECD (2023) observes that stakeholders are often not adequately involved in the policymaking process, leading to resistance, a lack of buy-in, and ultimately the ineffective implementation of policies. Moreover, stakeholder engagement is not only about consultation but also about empowering local actors to take ownership of climate change initiatives [73,74].

2.5. Climate Change and Regional Development

Climate change poses one of the greatest challenges to regional development in the 21st century. The impacts of climate change are not uniform across different geographies; they are experienced variably at the regional level, affecting local economies, ecosystems, and communities in diverse ways [1]. The nature of these impacts necessitates tailored regional responses that integrate climate change adaptation and mitigation strategies into broader development policies. The intersection of climate change and regional development is complex, with multiple dimensions that include economic, social, environmental, and political aspects [24]. At the economic level, regions dependent on climate-sensitive sectors such as agriculture, forestry, tourism, and fisheries are particularly vulnerable to climate variability and change. For instance, Chevallier et al. (2020) [75] demonstrate how projected temperature increases and altered precipitation patterns could significantly impact European agriculture, necessitating adaptive strategies tailored to regional climatic and socioeconomic conditions. From a social perspective, climate change exacerbates existing vulnerabilities and inequalities within and between regions. Populations in less developed regions often have limited capacity to adapt to climate change, making them more susceptible to its adverse effects [76]. Karami et al. (2023) [54] highlight the importance of social capital and institutional support in enhancing regional adaptive capacity, arguing

that social resilience is as critical as infrastructural and economic resilience in addressing climate change.

Environmental impacts are also a significant concern for regional development. Climate change can lead to biodiversity loss, altered water cycles, and increased frequency and intensity of extreme weather events, which can have profound implications for regional ecosystems and the services they provide [3]. These changes not only threaten the natural heritage of regions but also their economic viability and quality of life, as discussed by Rakibul and Khalid Md. (2014) [39] in their examination of the environmental dimensions of climate change impacts at the regional level.

Oliveira et al. (2015) [41] noted that, politically, regional authorities are increasingly recognized as pivotal actors in climate change governance. Their proximity to local issues and stakeholders gives them a unique vantage point to identify and implement effective climate change strategies. However, this also presents challenges, as regional governments often operate within constraints set by national and international frameworks. Cimato and Mullan (2010) [46] explore the evolving role of regional governments in climate policy, highlighting both the opportunities and challenges they face in integrating climate change considerations into regional development planning. In light of these complexities, there is a growing body of literature advocating for an integrated approach to climate change and regional development. Such an approach requires aligning climate change strategies with regional development goals, ensuring that climate actions support broader objectives of sustainable development. The IPCC (2014) [29] emphasizes the role of multi-level governance in facilitating this integration, suggesting that effective coordination among local, regional, national, and international actors is essential for coherent and comprehensive climate change responses. Furthermore, innovation plays a critical role in aligning climate change and regional development. Regions that harness innovation in sectors such as renewable energy, sustainable transport, and green technologies not only contribute to climate change mitigation but also stimulate economic growth and job creation [17,30,77–79].

3. Materials and Methods

3.1. Study Design

This study employed a quantitative research approach aimed at examining the integration of climate change strategies into policy and planning for regional development in Europe, especially in Greece. The choice of a quantitative method is predicated on its suitability for testing the study's hypotheses and its capacity for providing objective results that can be generalized across the European context. The study also adopted a cross-sectional design, which involved data collection at a single point in time. Cross-sectional studies are often used to capture a snapshot of a situation and examine relationships among variables at that specific moment [80]. Given the dynamic nature of climate change, regional policies, and development outcomes, a cross-sectional approach allowed for a snapshot assessment of the current state of affairs.

3.2. Target Population

The target population for this study consisted of environmental experts from various sectors and regions across Greece. Greece was chosen due to its diverse geographical and environmental characteristics, making it suitable for capturing a wide range of perspectives and experiences related to climate change strategies and regional development. Environmental experts in this context encompassed professionals, policymakers, researchers, and practitioners with expertise in environmental science, climate change, sustainability, regional development, and related fields. The selection of such a diverse group of experts aimed to ensure a comprehensive and well-informed assessment of the integration of climate change strategies into policy and planning for regional development in Greece.

3.3. Sample Size

The sample size of 270 participants was determined using the Krejcie and Morgan sample size determination table [81]. This table provides guidelines for selecting an appropriate sample size based on the total population and the desired level of confidence. In this case, the total population was considered to be the entire pool of environmental experts in Greece, and a confidence level of 95% was chosen.

3.4. Data Collection

The data collection for this research was primarily conducted through the distribution of a structured questionnaire. The questionnaire was designed to elicit responses from environmental experts regarding their views, experiences, and perceptions regarding the integration of climate change strategies into policy and planning for regional development. The survey instrument was emailed to the 270 identified environmental experts across Greece. Email communication allowed for efficient data collection while providing respondents with a convenient and flexible way to participate in the study. The questionnaire was carefully crafted to gather information on various aspects, including opportunities, barriers, common climate change strategies, and measures of regional development. The use of a questionnaire as the primary data collection method ensured the systematic collection of responses from a diverse group of experts.

A structured questionnaire was used to gather information, and it was intended to get the opinions of environmental specialists on how to incorporate climate change mitigation techniques into local development. This questionnaire comprised sections aimed at:

- Identifying current climate change strategies implemented within various sectors, such as renewable energy adoption, carbon footprint reduction, and climate resilience building.
- Assessing barriers to integrating these strategies into broader policy and planning frameworks. Barriers might include financial constraints, a lack of political will, or inadequate infrastructure.
- Exploring opportunities that could arise from integration, such as economic benefits, improved public health, or enhanced environmental sustainability.
- Evaluating measures of regional development, which include economic growth indicators, social cohesion metrics, and environmental sustainability achievements.

Respondents were asked to rate the extent of integration, barriers, and opportunities on a nominal scale, provide quantitative feedback on their experiences, and suggest actionable insights for better implementation of climate change strategies in regional planning.

The collected data was subsequently analyzed to assess the relationships between different variables, providing valuable insights into the integration of climate change strategies into regional policy and planning in Greece. The methodology employed in this study aimed to ensure the robustness and reliability of the data collected, facilitate a comprehensive analysis of the research objectives, and contribute to a deeper understanding of the complex dynamics at the intersection of climate change, regional development, and policy integration in Greece [82–84].

3.5. Operationalization of Variables

The study operationalizes regional development as the dependent variable, which was measured using a set of indicators such as the presence of specific climate goals, the allocation of resources for climate action, and the establishment of monitoring and evaluation mechanisms. Independent variables include barriers to the integration of climate change strategies into policy and planning, opportunities for integration, and common climate change strategies, which are hypothesized to influence the integration process. The measurement and operationalization of variables are presented briefly in Table 1.

Table 1. Operationalization/measurement of variables.

Variable Name	Description	Levels of Measurement
Dependent Variable		
Regional development	Multifaceted progress within a geographical region encompassing economic, social, and infrastructural dimensions.	Nominal Scale
Business environment	Conditions conducive to business operations and growth.	
Educational level of the population	The population's educational attainment.	
Level of gross regional product (GRP)	Economic output in monetary terms.	
Percentage of the population below the poverty line	Percentage of the population affected by poverty.	
Level of infrastructure quality	Quality of the region's infrastructural facilities.	
Independent Variables		
Opportunities in integration (X_1)	Perceived opportunities from integrating climate change strategies.	Nominal Scale
Barriers to integration (X_2)	Challenges impeding the integration of climate change strategies.	
Common climate change strategies (X_3)	Strategies employed to address climate change.	

Source: Authors' own work (2023).

3.6. Data Analysis

After the data was gathered, SPSS was used to code it and enter it into an analytical program. Using descriptive data, an overview of the respondents' demographics and the level of integration of climate change activities was given. The use of inferential statistics, particularly multiple correlation and regression analyses, was necessary to evaluate the proposed hypotheses and identify the critical elements affecting the successful integration of climate change policies into regional development plans. The relationship between the one dependent variable and the three independent variables was examined using multiple regression analysis. The three independent variables were opportunities for integrating climate change strategies into policy and planning, barriers to integrating climate change strategies into policy and planning, and common climate change strategies. A multivariate regression model helped to determine the coefficients of the several variables in Equation (1), which also doubled as the predicted values [23,83,84].

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon \quad (1)$$

where:

Y = Regional development across Greece;
β_0 = Constant (coefficient of intercept);
X_1 = Opportunities in integration;
X_2 = Barriers to integration;
X_3 = Common climate change strategies;
ε = A representation of the error term that relates to the study's multiple regression model.

The three hypotheses of this study were tested based on the obtained regression results at a 95% confidence interval or at the 0.05 significance level.

3.7. Ethical Considerations

In conducting this research, ethical considerations were strictly adhered to. Since the study involves the analysis of publicly available documents, the risk of ethical viola-

tions is minimal. However, the research maintained the confidentiality and anonymity of the regions by not associating negative findings with specific locations to avoid any potential harm.

4. Results

4.1. Demographic Characteristics of Respondents

The results on the demographic characteristics of the respondents are presented in Table 2.

Table 2. Participants' demographic information.

Categories	Frequency	Percentage (%)
Gender		
Male	192	66.7
Female	78	33.3
Age bracket		
Below 26 years	9	3.3
37–37 years	80	29.7
38–48 years	149	55.2
Above 48 years	32	11.9
Education Qualification		
Certificate	14	5.2
Diploma	35	12.9
University degree	221	81.9
Level of expertise		
Junior	9	3.3
Senior	108	40.0
Expert/Consultant	153	56.7
Total	270	100

Source: Authors' own work (2023).

The majority of the study participants (66.7%) were male, while 33.3% were female. This suggests that there was a higher representation of males among the participants. The largest age group among the respondents falls within the 38–48 year bracket, comprising 55.2% of the participants. This indicates that a significant proportion of your study's participants were in their late thirties or early forties. The majority of the respondents (81.9%) held a university degree, indicating a well-educated group of participants. A smaller proportion had a diploma (12.9%), and an even smaller proportion held certificates (5.2%). The largest group of participants (56.7%) were categorized as experts/consultants, suggesting that a significant portion of the respondents had a high level of expertise in the environmental sector. The next largest group (40.0%) were senior professionals, while a smaller percentage (3.3%) were categorized as junior professionals.

4.2. Descriptive Results

This study examined the different opportunities presented by climate change strategies for regional development, and the results are presented in Figure 1.

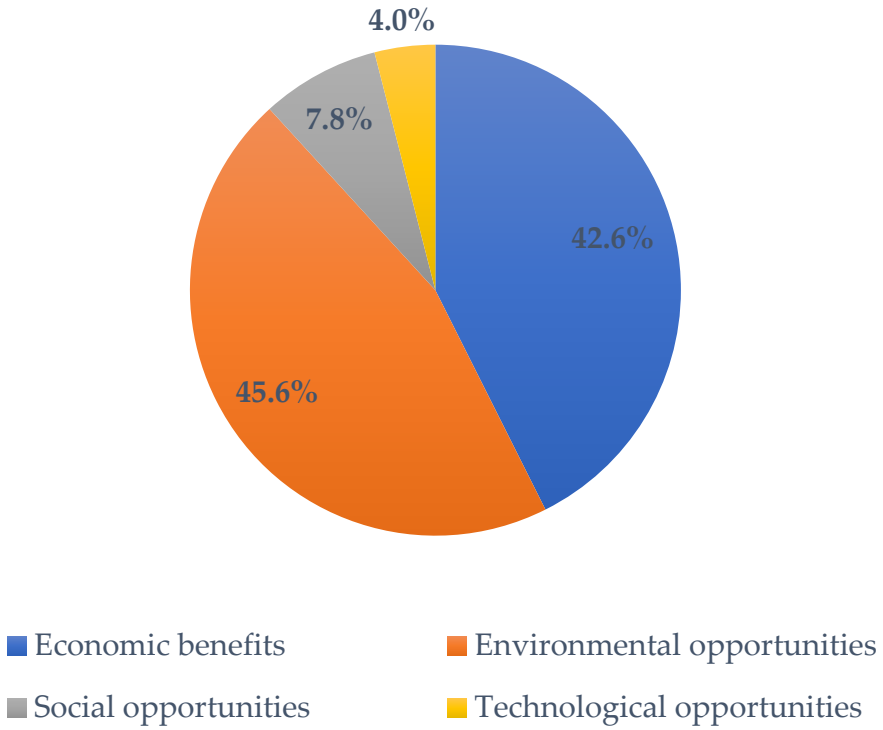

Figure 1. Opportunities presented by climate change strategies. Source: Authors' own work (2023).

The results in Figure 1 show that environmental opportunities received the highest percentage of responses from experts, with 123 out of 270 respondents (45.6%) recognizing them as significant. This suggests that a majority of experts believe that climate change strategies can offer various environmental benefits. These opportunities could include actions such as transitioning to clean and renewable energy sources, reducing greenhouse gas emissions, protecting ecosystems and biodiversity, and promoting sustainable land and water management. Environmental opportunities are critical because addressing climate change often involves mitigating its negative environmental impacts and preserving natural resources. Also, economic benefits were highly noted, with 115 out of 270 respondents (42.6%) acknowledging their importance. This indicates that experts recognize the potential for climate change strategies to generate economic advantages. Economic benefits may include the creation of green jobs, stimulating innovation and green technologies, improving energy efficiency, and enhancing the resilience of regional economies in the face of climate-related challenges. These benefits can contribute to sustainable economic growth and long-term prosperity. While less emphasized compared to economic and environmental opportunities, 21 out of 270 respondents (7.8%) still recognized social opportunities. These opportunities may relate to improving the overall quality of life for communities and individuals. Social opportunities can encompass aspects such as enhancing public health by reducing pollution, ensuring equitable access to resources and benefits, and promoting social cohesion and resilience to climate-related disruptions. Finally, technological opportunities received the lowest percentage of responses, with 11 out of 270 respondents (4.0%) highlighting their relevance. These opportunities pertain to the development and deployment of new technologies to address climate change challenges.

The study identified the challenges and barriers faced by European regions, especially Greece, in implementing climate change strategies, and the results are presented in Figure 2.

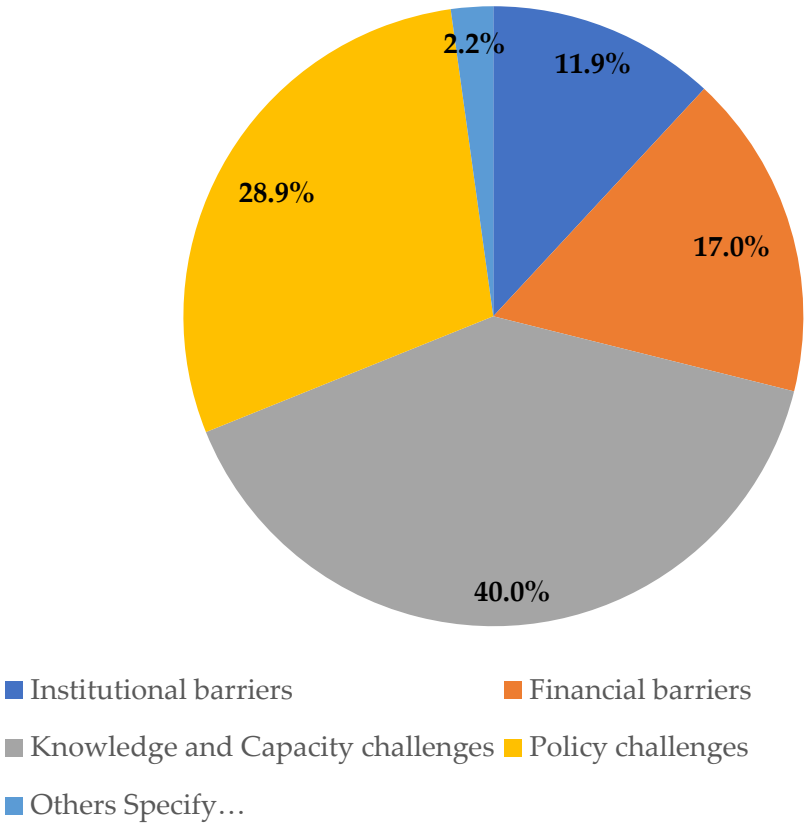

Figure 2. Barriers faced in implementing climate change strategies. Source: Authors' own work (2023).

According to the results, the majority of respondents (40%) cited knowledge and capacity challenges as a barrier to the integration of climate change strategies into policy and planning. This indicates that many European regions lack the necessary knowledge and capacity to effectively address climate change issues. This can include a lack of expertise, technical skills, and awareness among policymakers, planners, and other stakeholders regarding climate change mitigation and adaptation strategies. Financial barriers (17.0%) were also cited as a significant concern in implementing climate change strategies. These barriers can include limited funding for sustainable projects, high costs associated with climate action initiatives, and the need for investments in renewable energy, infrastructure, and technology. This was followed by 28.9% of respondents who cited policy challenges as a barrier: This category includes obstacles related to the development and implementation of climate policies and regulations. Furthermore, 11.0% of respondents cited institutional barriers (11.9%) as a barrier. Institutional barriers refer to challenges within the organizational structures of regional governments and other relevant institutions. This can include bureaucratic hurdles, resistance to change within institutions, and the need for better coordination and cooperation between various governmental departments and agencies. The lowest percentage (2.2%) mentioned other barriers such as public perception, cultural barriers, or specific regional challenges not covered in the other categories.

The study further identified the different common climate change strategies employed across Greece, and the results are presented in Figure 3.

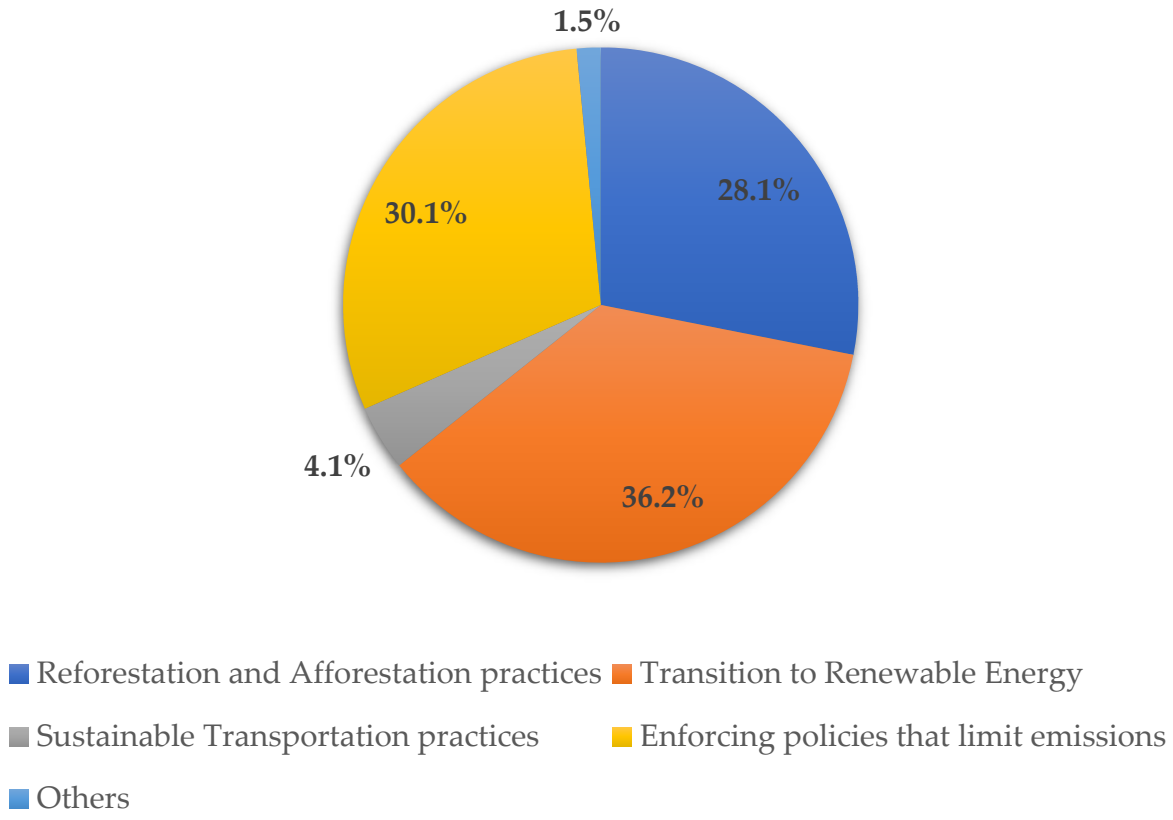

Figure 3. Common climate change strategies employed across Greece. Source: Authors' own work (2023).

This result indicates that the majority of respondents (36.2%) prioritize the transition to renewable energy sources. This aligns with a common global strategy to reduce greenhouse gas emissions by shifting away from fossil fuels. Greece has been making substantial investments in renewable energy, such as wind and solar power, to reduce its carbon footprint and increase energy security. The second-highest percentage (30.1%) highlights the importance of policy and regulatory measures in addressing climate change. This likely indicates that respondents in Greece see the need for government intervention to limit emissions. It suggests that there is support for legal frameworks and regulations aimed at reducing greenhouse gas emissions in the region. This was followed by 28.1% of respondents who noted that reforestation and afforestation practices are key climate change strategies. This justifies the role played by forests in sequestering carbon dioxide and mitigating climate change. Greece's commitment to reforestation aligns with its efforts to increase forest cover and combat deforestation. Furthermore, 4.1% noted that sustainable transportation practices are also a strategy to combat climate change. Greece has been taking steps to promote sustainable transportation, including public transit and electric vehicles, but the survey results suggest that there may be room for more emphasis on this area in regional development planning. The least portion of respondents (1.5%) mentioned other additional climate change strategies, such as smart urban planning, energy-efficient practices, low-carbon approaches, and global cooperation, which are not as highly prioritized among the respondents.

The study also established the different measures of regional development, and the results are presented in Table 3.

Table 3. Measures of regional development.

	Frequency	Percentage (%)
Business environment	26	9.6
Educational level of the population	41	15.2
Level of gross regional product (GRP)	103	38.1
Percentage of the population living below the poverty line	18	6.7
Level of infrastructure quality	82	30.4
Total	270	100

Source: Authors' own work (2023).

From Table 3, the level of gross regional product (GRP) (38.1%) received the highest percentage of responses, indicating that a significant portion of experts in the environmental sector consider economic factors, specifically regional economic output, as a critical aspect of regional development. It suggests that economic growth and prosperity are central concerns when considering climate change strategies and their integration into regional policies. Infrastructure quality, including factors like transportation, energy, and telecommunications, also received substantial attention from experts (30.4%). This underscores the importance of resilient and sustainable infrastructure in addressing climate change challenges and supporting regional development. Furthermore, the educational attainment of the population was identified as a key factor by 15.2% of respondents. This suggests that investing in education and building a skilled workforce is seen as important for both mitigating and adapting to climate change while promoting regional development. Also, a smaller but still significant percentage of respondents (9.6%) highlighted the significance of the business environment. This likely pertains to the role of a conducive business environment in attracting investments and fostering innovation related to climate change solutions. While poverty reduction is a crucial element of sustainable development, it received the lowest percentage of responses (6.7%). It is possible that experts in the environmental sector, in this context, may prioritize economic growth and infrastructure development as more immediate concerns when integrating climate change strategies into regional planning.

4.3. Correlation Analysis

The correlation analysis table, Table 4, presents the Pearson correlation coefficients and their significance levels between four variables: regional development, opportunities in integration, barriers to integration, and common climate change strategies.

Table 4. Correlation between opportunities for the integration of climate change strategies into policy and planning, barriers to integration, common climate change strategies, and regional development.

		Regional Development	Opportunities in Integration	Barriers to Integration	Common Climate Change Strategies
Regional development	Pearson Correlation	1			
	Sig. (2-tailed)				
Opportunities in integration	Pearson Correlation	0.653 **	1		
	Sig. (2-tailed)	0.002			
Barriers to integration	Pearson Correlation	0.151 **	0.192 **	1	
	Sig. (2-tailed)	0.064	0.010		
Common climate change strategies	Pearson Correlation	0.848 **	0.326 **	0.453 **	1
	Sig. (2-tailed)	0.009	0.025	0.000	

** Correlation is significant at the 0.05 level (2-tailed).

There is a strong positive correlation (0.653) between regional development and opportunities in integration, indicating that as opportunities in the integration of climate change strategies into policy and planning increase, regional development also tends to increase. The correlation is statistically significant at the 0.05 level (2-tailed), with a *p*-value of 0.002, which is well below the conventional threshold of 0.05. There is a positive correlation (0.151) between regional development and barriers to integration. However, this correlation is not statistically significant at the 0.05 level, with a *p*-value of 0.064. This implies that the relationship between these two variables is not strong, and any observed correlation could be due to chance. There is a very strong positive correlation (0.848) between regional development and common climate change strategies. This correlation is statistically significant at the 0.05 level (2-tailed), with a *p*-value of 0.009, indicating a robust relationship. This suggests that regions that implement common climate change strategies tend to experience greater regional development. There is a moderately positive correlation (0.326) between opportunities for integration and common climate change strategies, which is statistically significant at the 0.05 level (2-tailed), with a *p*-value of 0.025. This indicates that regions that identify more opportunities for integration also tend to implement common climate change strategies. There is a moderately positive correlation (0.453) between barriers to integration and common climate change strategies. The correlation is statistically significant at the 0.05 level (2-tailed), with a *p*-value of 0.000, indicating a strong relationship. This suggests that regions that face more barriers also tend to engage more in common climate change strategies, perhaps as a response to overcoming these barriers.

4.4. Regression

Table 5 shows the results of a multiple regression analysis.

Table 5. Multiple regression analysis.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant	37.02	5.17		4.36	0.002
Opportunities in integration	0.254	0.152	0.046	0.194	0.001
Barriers to integration	0.121	0.038	0.530	6.03	0.000
Common climate change strategies	0.401	0.038	0.251	6.03	0.000

Dependent variable: Regional development.

The results from Table 6 and the R square value of 0.646 suggest that approximately 64.6% of the variability in regional development is explained by the model. The adjusted R square is substantially higher at 0.711, adjusting for the number of predictors in the model. The F statistic is significant (Sig. = 0.00), indicating that the model is a good fit for the data.

Table 6. Model summary.

Model	R Square	Adjusted R Square	F	Sig.
	0.646 *	0.711	41.05	0.00 *

* Predictors (constant): opportunities and barriers in integration, and common climate change strategies.

Opportunities for integrating climate change strategies have a positive, unstandardized coefficient, indicating a positive relationship with regional development. For each unit increase in opportunities, there is a 25.4% increase in regional development, holding other variables constant. The statistical significance (Sig.) of 0.001 indicated a high level of significance. Therefore, hypothesis one (H1) was accepted, indicating that there is a signif-

icant relationship between opportunities for the integration of climate change strategies into policy and planning and the level of regional development in Greece.

Barriers have a positive unstandardized coefficient, which is counterintuitive as one would expect barriers to have a negative effect on regional development. However, this positive coefficient might suggest that regions facing barriers are, perhaps, more engaged and, therefore, experience greater development. The high standardized coefficient (Beta) of 0.530 indicates that barriers are the most influential variable in the model. The T value and significance level reinforce this, showing that barriers are a significant predictor of regional development. However, this did not allow acceptance of hypothesis two (H2), which suggested that barriers to the integration of climate change strategies into policy and planning have a negative effect on the level of regional development in Greece.

Common climate change strategies have a significant positive relationship with regional development. The unstandardized coefficient indicates that for each unit increase in common strategies, regional development increases by 0.401 units, holding other variables constant. The significance level is below 0.001, indicating a high degree of confidence in this finding. Therefore, hypothesis three (H3) was accepted, meaning that the integration of climate change strategies into regional policy and planning positively correlates with sustainable regional development outcomes.

5. Discussion

This study sought to explore the integration of climate change strategies into policy and planning for regional development, with a specific focus on the European context, especially in Greece. The findings indicate that the extent of integration varies significantly across regions, influenced by a myriad of factors including political commitment, economic capabilities, and public awareness. The study found a strong positive correlation between opportunities in the integration of climate change strategies and regional development. This indicates that regions in Europe that identify and seize opportunities to integrate climate change strategies into their policies and planning tend to experience higher levels of regional development. This finding is in line with the literature, which emphasizes the potential benefits of integrating climate change strategies into regional development [54,75]. The positive relationship between common climate change strategies and regional development further supports the idea that regions actively implementing climate change strategies tend to experience greater development. This aligns with the concept of policy integration theory, which suggests that incorporating climate objectives across various policy domains can lead to more coherent and effective responses to climate change challenges [28,71]. The positive impact of common climate change strategies on regional development highlights the importance of coordinated efforts at the regional level. The results also show a positive but weak correlation between barriers to integration and regional development. This unexpected finding suggests that regions facing more barriers may be more engaged in addressing climate change, potentially due to the urgency and importance of the issue. However, it is important to note that this correlation is not statistically significant, and further research is needed to fully understand the complex relationship between barriers and regional development [49,85,86].

The study identified several barriers to the integration of climate change strategies into regional development policies in Europe, especially in Greece. Knowledge and capacity challenges were cited as a significant barrier by 40% of respondents. This aligns with the literature, which often highlights the need for increased awareness, technical expertise, and capacity-building to address climate change effectively [3,29]. Regions may struggle to integrate climate change strategies if they lack the necessary knowledge and skills among policymakers and stakeholders. Financial barriers were also identified as a significant challenge, with 17% of respondents highlighting limited funding for sustainable projects and the high costs associated with climate action initiatives. This finding is consistent with the literature, which emphasizes the need for financial resources to implement climate

change strategies effectively [32,33]. In less affluent regions, financial constraints may be even more pronounced, making it challenging to invest in climate initiatives [44,87].

The study also highlighted policy challenges, with 28.9% of respondents citing obstacles related to the development and implementation of climate policies and regulations. This reflects the complexities of coordinating climate strategies across various policy domains, as discussed in the literature [47]. Bureaucratic hurdles and a lack of coherent strategy can hinder effective policy development and implementation. Institutional barriers were identified, indicating that challenges within organizational structures, such as resistance to change and a lack of coordination, can impede climate integration efforts. This aligns with the concept of institutional fragmentation discussed in the literature [46], where different government departments and agencies may operate in isolation. Overall, the identified barriers are consistent with the existing literature, highlighting the multifaceted challenges that regions face when integrating climate change strategies into their policies and planning.

The study found that the transition to renewable energy sources was the most commonly integrated climate change strategy, with 36.2% of respondents emphasizing its importance. This aligns with global efforts to reduce greenhouse gas emissions by shifting away from fossil fuels, which have gained prominence in climate change policies [1]. The positive relationship between this strategy and regional development suggests that investing in renewable energy can stimulate economic growth and innovation. Enforcing policies that limit emissions received significant attention, with 30.1% of respondents recognizing their importance. This reflects the need for regulatory measures to reduce greenhouse gas emissions, which is a key aspect of climate change mitigation [30].

The positive correlation between this strategy and regional development underscores the role of effective policies in addressing climate change. Reforestation and afforestation practices were noted as important by 28.1% of respondents, highlighting the significance of preserving ecosystems and biodiversity. This aligns with the literature emphasizing the role of forests in sequestering carbon dioxide and mitigating climate change [75]. The positive relationship between these practices and regional development suggests that investing in nature-based solutions can benefit both the environment and development. Sustainable transportation practices received less attention, with only 4.1% of respondents emphasizing their importance. However, the positive correlation between sustainable transportation practices and regional development suggests that regions should pay more attention to improving transportation sustainability. This aligns with the literature advocating for sustainable urban planning and transportation to reduce pollution and enhance public health [18].

The study's findings highlight the relevance of these common climate change strategies for promoting regional development in Greece. Integrating these strategies can lead to economic benefits, environmental opportunities, and social improvements, in line with the opportunities discussed in the literature [15]. Regions that successfully implement these strategies can position themselves as leaders in sustainability and innovation, as emphasized in the literature [54,79].

6. Conclusions

This study focused on examining the integration of climate change strategies into policy and planning for regional development in Europe, especially in Greece, shedding light on various facets of this complex and pressing issue. Climate change poses a significant threat to regional development, with far-reaching implications for economic stability, environmental sustainability, and social well-being. The urgency of addressing climate change is underscored by the increasingly pronounced manifestations of climate change in Greece, including extreme weather events, rising sea levels, and shifting precipitation patterns. The study reveals that regions that identify more opportunities tend to experience greater regional development. This finding supports the importance of recognizing and leveraging the potential benefits and synergies that climate change strategies can offer in

terms of economic growth, environmental protection, social well-being, and technological innovation. Furthermore, the study identifies those barriers to the integration of climate change strategies that, despite having a positive unstandardized coefficient, still play a significant role in regional development. Regions facing more barriers tend to engage more in common climate change strategies, possibly as a response to overcome these challenges, which makes such regions more resilient and adaptive in their pursuit of sustainable development. The study emphasizes the critical role of common climate change strategies in promoting regional development. Regions that implement common strategies tend to experience greater regional development. These strategies, such as transitioning to renewable energy sources and enforcing policies to limit emissions, align with global efforts to mitigate climate change while fostering economic growth and environmental sustainability. In light of these findings, it is evident that the integration of climate change strategies into regional policy and planning is not only necessary for addressing the climate crisis but also holds significant potential for enhancing regional development. European regions must capitalize on the opportunities presented by climate change strategies while actively addressing the barriers that may impede progress. Policymakers and stakeholders should prioritize the adoption of common climate change strategies that align with long-term sustainability goals, thus positioning Europe as a leader in climate action and regional development. This study contributes valuable insights into the ongoing discourse on climate change integration in regional development policies and provides a foundation for informed decision-making in Europe, especially in Greece and beyond.

6.1. Limitations and Areas for Future Research

The possibilities for integrating climate change plans into planning and policy, integration hurdles, shared climate change strategies, and regional development are all heavily covered in the current study. However, there is not much emphasis on environmentally friendly ways to mitigate the effects of climate change. Thus, future studies can concentrate on novel systems that can assist in addressing the environmental and socioeconomic effects of climate change.

Any assertion concerning mitigation and adaptation techniques for climate change should be regarded as inaccurate, as the study was limited to English-language publications. One of the study's limitations could be that the questionnaire was completed remotely, which is undoubtedly insufficient to replace in-person interactions. Future research should concentrate on this insight, as there has not been much attention paid to the factors that affect governance's capacity to improve mitigation and adaptation plans for climate change.

The sample's makeup and the survey's methodology are primarily to blame for the study's shortcomings. Though the sample size of 270 environmental professionals was appropriate, the majority of the responses were from the environmental business sector, with fewer responses from public sector companies and services primarily pertaining to the integration of climate change tactics into planning and policy making for regional development. Another drawback that was taken into consideration was the participant's unwillingness to respond to and submit the survey in its entirety and on time.

6.2. Implications and Recommendations

The study's findings have several implications for policymakers and regional authorities in Europe. First, there is a need to prioritize capacity-building and knowledge dissemination to address knowledge and capacity challenges. Providing training and education on climate change mitigation and adaptation strategies can empower regions to integrate climate objectives effectively.

Addressing financial barriers requires innovative financing mechanisms and partnerships. Regions should explore opportunities for public-private collaborations and seek funding from national and international sources to support climate initiatives.

Policymakers should focus on overcoming policy challenges by developing coherent and comprehensive climate policies that span various sectors. Streamlining regulations and promoting interdepartmental cooperation can facilitate policy implementation.

Addressing institutional barriers necessitates organizational reforms and a cultural shift towards embracing climate change as a cross-cutting issue. Regions should encourage collaboration between government departments and agencies to promote policy integration.

Author Contributions: Conceptualization, S.K., F.C., K.-N.K. and E.L.; methodology, S.K. and D.K.; software, O.P.; validation, S.K., D.K., F.C., K.-N.K. and E.L.; formal analysis, D.K.; investigation, S.K. and O.P.; resources, O.P., F.C., K.-N.K. and E.L.; data curation, D.K. and O.P.; writing—original draft preparation, S.K.; writing—review and editing, D.K.; visualization, D.K. and O.P.; supervision, S.K., F.C., K.-N.K. and E.L.; project administration, S.K., F.C., K.-N.K. and E.L. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was approved by the Research Ethics Committee of the University of Western Macedonia (REC-UOWM) (Approval Code: 208).

Data Availability Statement: The original contributions presented in the study are included in the article, further inquiries can be directed to the corresponding authors.

Acknowledgments: The authors thank the editors and the anonymous reviewers for the feedback and their insightful comments on the original submission. All errors and omissions remain the responsibility of the authors.

Conflicts of Interest: The authors declare no conflicts of interest.

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