

# Leadership role in sustainable future of circular economy: Climate, economy, and environment interplay

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**Abstract:** The issue of climate change is a significant concern in contemporary society characterized by a volatile, uncertain, complex, and ambiguous (VUCA) environment. Asian nations are also dealing with issues related to climate change. The objective of this study is to ascertain the relationship between climate change and its impact on both the economy and the environment. This research examines the moderating influence of leadership skills on the variables of climate change, the economy, and the environment. The study employed a time lag research design to gather data in Pakistan. The analysis was based on a structural equation modelling approach with a sample size of 4,243 participants. The results suggest that leadership skills have a significant moderating impact on the relationship between climate change and the economy, and between climate change and the environment. The research highlights the impact of climate change on the economy and environment of a developing nation. The findings indicate that effective leadership abilities are necessary to manage environmental and economic conditions for long-term sustainability. The study holds significant implications for both theoretical and practical domains, particularly in enhancing climate control by incorporating leadership competencies. This research contributes to the concept of circular economy by showcasing the complex relationship between climate change, environment, economy, and leadership. The research extends noteworthy avenues for future exploration, laying the foundation for further contributions to the existing body of literature related to circular economy.

**Keywords:** Leadership skills, climate change, environment, global warming, circular economy.

**JEL Classification:** Q01, M2, M10, O1, O15.

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## Introduction

In the modern world, climate change has emerged as a major problem. It has led to different kinds of issues that are directly influencing the environment (Gura et al., 2023; Iqbal et al., 2021). The sustainability of the environment is possible when the government and other supporting agencies are working together to protect the environment. Rich countries have launched different kinds of initiatives to improve sustainability in the environment (Sheller, 2021; Stoian et al., 2023). The world leaders, including the former prime minister of Pakistan, who initiated the Billion Trees Tsunami program, strive to save the environment with natural and green weather. The sustainability of the environment can be reached through large-scale initiatives for the benefit of the public. The reliability of public attitude towards the advancement of climate sustainability can motivate the government further to take direct steps for improvement in government facilities (Mohsin et al., 2021). The developed nations are advanced in their environment protection attitude that is reliable for a better and more productive approach.

The role of leadership is critical in the working administration of any country. Countries without leaders fail to achieve prosperity (Bradley et al., 2020). In this way, the economic conditions require to demonstrate leadership for the environment. The success of the government performance can be a useful way to achieve sustainability in the environment (Jeswani et al., 2021). The better working approach of leaders in the world provides a way to the sustainability of the environment. The success of the government in terms of sustainable development is possible when the role of leadership is advanced to protect the environment (Howarth et al., 2020). Many nations have paid less attention to improving their environment, and the natural hazards damaged a lot of their property. The success of the government working for the protection of the environment is possible with long-term strategic planning to get better results in the way of sustainable performance (Maja & Ayano, 2021).

The escalating environmental challenges facing our planet, from global climate change to local pollution, have prompted responses at all levels of society (Hart & Pomponi, 2021). The circular economy, with its focus on reducing waste, reusing resources, and regenerating

natural systems, has emerged as a promising strategy to address these pressing concerns (Kaur et al., 2024). Previous research highlighted the significant potential of circular economy approaches to contribute to climate change mitigation. Pham et al. (2020) highlighted that climate change is a fundamental problem for successful development. Environmental problems emerge when the government of a country is not serious about solving environmental issues (Shahzad, 2020). Furthermore, the problem of environmental issues is not limited to the climate only, economic issues have also emerged from it. Indeed, Asian countries are also facing environmental issues (Balsalobre-Lorente et al., 2020). Pakistan being an atomic power in Asia is facing environmental issues that are not properly managed by the community. Economic and environmental issues are raised in Pakistan as it faced floods every year for a decade (Tariq et al., 2020). A lot of community is disturbed by floods including the agriculture sector because of this issue. There is less focus on the government to develop long-term policies for climate control in the country (Hussain et al., 2020). These little initiatives to control the climate are dangerous for the community that is suffering from such kinds of hazards.

Recent research has emphasized the role of leadership in achieving environmental sustainability and environmental performance (Yousaf et al., 2023). Moreover, leaders can raise awareness about the circular economy and its benefits. Effective leadership is crucial for driving the transition towards circularity, for the practical implementation of circular economy and its widespread adoption. Leaders educate employees, customers, and the wider public about the importance of sustainable practices and empower them to make informed choices (Ma et al., 2024). The circular economy is seen as a viable solution for climate change management.

The purpose of this research is to determine the direct effect of climate change on the economy and environment in Pakistan. This study also aims to test the moderating impact of leadership skills on climate change, the economy, and the environment. The research has novelty since a few studies were conducted to explore the abovementioned relationship, particularly in the context of Pakistan. The research has remarkable implications for theory and practice as well as for improving climate control

by considering leadership skills. Furthermore, the study has significant future directions that are necessary to be taken by scholars in their future research to contribute to the literature. This paper is divided into an introduction, literature review, methodology, data analysis, discussion and conclusion, limitations, and future directions.

## 1 Theoretical background

Markkanen and Anger-Kraavi (2019) argued that the economies of modern countries are disturbed due to the issues related to climate change. Furthermore, Nasir et al. (2019) highlighted that climate change is a factor that must be considered to improve the economic situation of any country. In this vein, the circular economy concept is closely associated with tackling climate change (Leal Filho et al., 2023). The role of climate change is critical for the economy as hazards caused by it and other climate-related consequences significantly impact economic activities. The relationship of climate change is direct with the economic downsizing in the country due to its dangerous effect on progress and prosperity. Streletskiy et al. (2019) highlighted that developed countries are focusing on the issues related to climate change to ensure that the effect of climate change should not damage the economic growth in the country. The less focus on climate change can affect businesses, and the interest of investors is also down due to it. Enterprises are not achieving their import and export targets, which is an obstacle to progress on sustainable development due to climate change (Nawaz et al., 2021). Slow progress towards improving the environment and reducing the impact of climate change may result in a less productive approach to the environment and sustainability (Ehsanullah et al., 2021). Conversely, focusing on climate change can contribute to sustainable development goals (SDGs). The fundamental way to combat climate change can be to improve the environment and achieve sustainability. Therefore, while working on economic growth, the government must also address the negative effect of climate change.

*H1: There is a relationship between climate change and the economy.*

The impact of climate change on the environment is negative because many businesses are closed due to a threatening environment.

Previous studies illustrated adverse impact of climate change on the business (Dogru et al., 2019). Natural disasters caused by climate change are dangerous for the environment and ecosystem that is not acceptable for sustainability (Confetto & Covucci, 2021; Norouzi et al., 2020). To achieve sustainability goals, the environment should be appropriately managed by the policies of the government. For example, the carbon emissions in the environment should be reduced over time. Environmental sustainability can be achieved by taking reasonable actions. The damaged environment is problematic for the economic growth of a country (Hoang et al., 2023; Khan et al., 2019). In this regard, the circular economy is increasingly recognized as a potential solution to mitigate climate change. Circular economy practices, such as material reuse and recycling, can significantly reduce greenhouse gas emissions in various sectors (Leal Filho et al., 2023). Furthermore, government policies for long-term implications can provide a better way forward to improve the environment. The leadership is required to take strategic actions to protect the environment and to avoid detrimental economic conditions (Dale et al., 2020). Sustainable development is possible with the long-term policies of the government that is the fundamental source to get advancement in the environment. The understanding and responsibility of the citizens for better environmental conditions can be helpful to save the environment that is necessary to improve the sustainability of the country (Srivastava et al., 2023; Żuk & Szulecki, 2020). However, for the protection of the environment and to reduce the impacts of climate change relevant actions are required.

*H2: There is a relationship between climate change and the environment.*

Leadership in any country plays a critical role in the advancement of the environment. Leaders shape policies to meet social, economic, and environmental goals, achieve sustainability, and build a circular economy (Covucci et al., 2024). The circular economy thrives on collaboration. Leaders facilitate partnerships across different sectors, organizations, and stakeholders to create circular systems and share resources effectively. The policies developed and implemented by the leadership play a critical role in the way of successful performance

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(Balogun et al., 2020). The qualities of leaders are considered appropriate for the development of the economy. Leaders should develop long-term plans for improved economic conditions and for achieving sustainability (Pettorelli et al., 2021). In this regard, leadership skills need to be demonstrated. Generating knowledge through leadership skills can improve economic and environmental conditions (Bos & Gupta, 2019). Countries affected by climate change in particular require leaders with the appropriate skills to manage their economies and the environment. The available facilities for economic growth are useless when the economic environment of a country is not stable for working (Zheng et al., 2019). Access to management policies and initiatives can be useful in monitoring the environment and improving conditions. The leaders of developed nations are more concerned with advancing the economic situation of the country. Access to usable information can be a step forward in developing leadership skills (Rehman et al., 2021). Leadership with experience can play a significant role in ameliorating economic condition and boost climate change mitigation efforts.

*H3: There is a moderating role of leadership skills between climate change and the economy.*

Climate change is considered a critical factor for the environment. The relationship between climate change and the environment

requires that leaders work on mitigation of the problem (Skovgaard & van Asselt, 2019). For this reason, leadership skills should be improved to take collective action. When the leaders are sincere in working for the advancement of climate change, they are deliberately working to improve the environment (Sovacool, 2021; Srivastava et al., 2023). Leaders are expected to drive innovation, improve organizational effectiveness, and implement changes to address current complex environmental challenges (Gigauri & Khan, 2025). Working on climate is required by the leaders as they are policymakers and decision-makers. Leaders can gain public support while implementing the initiatives aiming at dealing with climate change (Prideaux et al., 2020). Better leadership with strategic planning can facilitate the government to solve the critical problems related to the environment (Iqbal et al., 2021). Furthermore, the real-time monitoring of the actions by leaders can provide a way to reduce the emission of carbon and protect the environment in a reliable way (Bradley et al., 2020). The majority of people are willing to support their leadership in dealing with climate change-related issues.

*H4: There is a moderating role of leadership skills between climate change and the environment.*

The theoretical model of this research is based on four variables, including the moderating role of leadership skills, shown in Fig. 1.

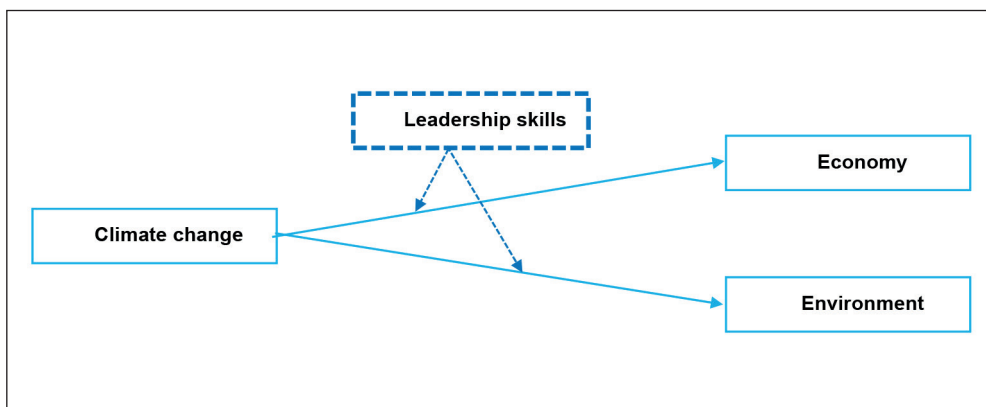


Fig. 1: Theoretical model

Source: own

## 2 Research methodology

The selection of a quantitative research design and survey-based methodology in this study is informed by several factors. Firstly, the research aims to investigate the relationships between climate change, leadership, the economy, and the environment, which are all complex and multifaceted phenomena that can be challenging to capture through qualitative research alone. A quantitative approach uses statistical techniques to analyze large sets of data, allowing for a more comprehensive understanding of the relationships between the variables of interest (Sueubayeva et al., 2025). Finally, the use of existing studies and measures from the literature ensures that the study is grounded in established theoretical and empirical frameworks, thereby enhancing the reliability and validity of the data collected. Overall, the choice of a quantitative research design and survey-based methodology is appropriate for this study given the complexity of the research questions, the need to collect data on a large scale, and the desire to ensure the reliability and validity of the results.

The items for climate change are taken from the study of Christensen and Knezek (2015) after determining the Cronbach alpha > 0.78 and composite reliability 0.73. Also, the items for leadership skills are taken from the study of Gilfoyle et al. (2007) after determining the Cronbach alpha > 0.72 and composite reliability 0.77. On the other hand, the items for the economy are taken from the study of Taiwo et al. (2012) after determining the Cronbach alpha > 0.71 and composite reliability 0.79. Finally, the items for the environment are taken from the study of Noordin and Sulaiman (2010) after determining the Cronbach alpha > 0.83 and composite reliability 0.81.

Pakistan was chosen for data collection because in the previous years the country's leadership, namely Imran Khan, the former prime minister, has taken a number of initiatives to mitigate environmental problems. He also raised his voice in several international forums for a collective effort to combat climate change (Rahman et al., 2022). The population for this research was the general public in Pakistan, who were asked to provide their views on the role of leadership in relation to green initiatives and climate change, and how these initiatives impact the country's environment and economy. In April 2023, the respondents

from major cities across different provinces of Pakistan, including Lahore, Karachi, Faisalabad, Islamabad, Multan, and Peshawar, were surveyed to collect data. This study has shown no bias in data collection because people from every walk of life are targeted for data collection. The respondents to this research were asked to fill out a hard copy of the questionnaire, and an introductory note regarding the purpose of the study was given on the questionnaire. Their consent was taken on the questionnaire, and it was ensured that the information would not be used for commercial purposes. A total of 5,044 questionnaires were distributed in two waves using time lag approach, and data was collected successfully on 4,299 questionnaires. After conducting initial screening, the final sample size of this research was based on 4,243 responses. This research has used the structural equation modelling to analyze the data since many recent relevant studies have utilized the same method (Khan et al., 2022).

## 3 Results and discussion

### 3.1 Results

The normality of data is checked at the initial stage of data analysis. This normality is tested to determine the skewness, kurtosis, and missing values. These findings help to determine the usability of data for further analysis. In this way, the skewness values must be less than +1 which is acceptable. Furthermore, the kurtosis values must be less than -1 which is also acceptable (Royston, 1992). Moreover, the missing values are tested, and the analysis revealed that there are no missing values in this data. Thus, the data collected for this study is considered normal for further data analysis tests (Tab. 1).

Furthermore, the factor loadings of the study's measurements are tested to determine whether the study's measurements are fit for data analysis or not. The data factor loadings for significance should be above 0.60 (Shevlin & Miles, 1998). Thus, this research has appropriate validity (Tab. 2).

In addition, the test for convergent validity is used to determine the reliability and validity of data. The Cronbach's alpha, composite reliability and average variance extracted are tested in this stage. The Cronbach alpha > 0.70 is acceptable (Tavakol & Dennick, 2011), the composite reliability > 0.70 (Alarcón et al.,

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**Tab. 1: Data normality**

Items	No.	Missing	Mean	Median	Min	Max	Standard deviation	Excess kurtosis	Skewness
CC1	1	0	4.072	4	1	5	1.072	0.816	-1.169
CC2	2	0	3.578	4	1	5	1.149	-0.333	-0.572
CC3	3	0	3.960	4	1	5	1.055	-0.078	-0.791
CC4	4	0	3.957	4	1	5	1.022	0.173	-0.830
CC5	5	0	3.448	3	1	5	1.150	-0.464	-0.422
LS1	6	0	3.574	4	1	5	1.130	-0.466	-0.494
LS2	7	0	3.610	4	1	5	1.183	-0.473	-0.574
LS3	8	0	4.448	5	1	5	0.955	2.897	-1.852
LS4	9	0	4.231	5	1	5	1.046	1.132	-1.349
LS5	10	0	4.007	4	1	5	1.177	0.439	-1.135
LS6	11	0	4.083	4	1	5	1.157	0.634	-1.216
EN1	12	0	3.928	4	1	5	1.157	0.149	-0.970
EN2	13	0	4.072	4	1	5	1.122	0.684	-1.192
EN3	14	0	4.119	4	1	5	1.090	0.877	-1.248
EN4	15	0	3.787	4	1	5	1.261	-0.401	-0.787
EN5	16	0	3.668	4	1	5	1.183	-0.475	-0.610
EC1	17	0	3.986	4	1	5	1.048	0.334	-0.918
EC2	18	0	4.065	4	1	5	0.996	0.519	-0.990
EC3	19	0	4.025	4	1	5	1.035	0.629	-1.032
EC4	20	0	4.054	4	1	5	1.051	0.628	-1.083
EC5	21	0	3.978	4	1	5	1.108	0.296	-0.983
EC6	22	0	3.783	4	1	5	1.116	-0.125	-0.739

Note: CC – climate change; LS – leadership skills; EN – environment; EC – economy.

Source: own

**Tab. 2: Factor loadings – Part 1**

Items	Climate change	Economy	Environment	Leadership skills
CC1	0.681			
CC2	0.692			
CC3	0.833			
CC4	0.859			
CC5	0.755			
EC1		0.872		
EC2		0.851		

Tab. 2: Factor loadings – Part 2

Items	Climate change	Economy	Environment	Leadership skills
EC3		0.856		
EC4		0.905		
EC5		0.867		
EC6		0.839		
EN1			0.873	
EN2			0.872	
EN3			0.837	
EN4			0.859	
EN5			0.640	
LS1				0.609
LS2				0.693
LS3				0.663
LS4				0.845
LS5				0.843
LS6				0.823

Note: CC – climate change; LS – leadership skills; EN – environment; EC – economy.

Source: own

Tab. 3: Cronbach alpha, composite reliability, and average variance extracted

Constructs	Cronbach's alpha	Composite reliability	Average variance extracted
Climate change	0.823	0.877	0.589
Economy	0.933	0.947	0.749
Environment	0.876	0.911	0.674
Leadership skills	0.843	0.885	0.566

Source: own

2015), and the average variance extracted > 0.50 (Alarcón et al., 2015) is accepted. The findings available in Tab. 3 demonstrate that the study has achieved a reliability test, and the data used in this study is valid. Thus, the findings are appropriate, and data can be used for further tests.

The discriminant validity of this research data is tested with the heterotrait-monotrait method. This method is recommended when the model of the study is complex. The values in the matrix

must be less than 0.90 for significant reliability and validity (Gold et al., 2001). Thus, the findings available in Tab. 4 demonstrated that the study has achieved discriminant validity.

Furthermore, the cross-loadings are also tested to determine the validity of the study data. This method is used to check whether the items used for different variables are the same or different. Barlat et al. (2013) recommended that the values of cross-loadings for the items representing one construct should

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**Tab. 4: Heterotrait-monotrait**

	Climate change	Economy	Environment	Leadership skills
Climate change				
Economy	0.650			
Environment	0.811	0.766		
Leadership skills	0.867	0.644	0.694	

Source: own

**Tab. 5: Cross-loadings**

Items	Climate change	Economy	Environment	Leadership skills
<b>CC1</b>	0.681	0.298	0.478	0.511
<b>CC2</b>	0.692	0.388	0.455	0.449
<b>CC3</b>	0.833	0.475	0.579	0.594
<b>CC4</b>	0.859	0.495	0.616	0.630
<b>CC5</b>	0.755	0.531	0.495	0.548
<b>EC1</b>	0.447	0.872	0.578	0.452
<b>EC2</b>	0.500	0.851	0.616	0.527
<b>EC3</b>	0.482	0.856	0.564	0.473
<b>EC4</b>	0.527	0.905	0.590	0.505
<b>EC5</b>	0.527	0.867	0.569	0.523
<b>EC6</b>	0.512	0.839	0.572	0.519
<b>EN1</b>	0.619	0.566	0.873	0.745
<b>EN2</b>	0.576	0.543	0.872	0.728
<b>EN3</b>	0.517	0.427	0.837	0.707
<b>EN4</b>	0.601	0.561	0.859	0.687
<b>EN5</b>	0.512	0.633	0.640	0.475
<b>LS1</b>	0.608	0.433	0.452	0.609
<b>LS2</b>	0.615	0.566	0.543	0.693
<b>LS3</b>	0.417	0.229	0.496	0.663
<b>LS4</b>	0.505	0.416	0.711	0.845
<b>LS5</b>	0.509	0.447	0.709	0.843
<b>LS6</b>	0.496	0.481	0.738	0.823

Note: CC – climate change; LS – leadership skills; EN – environment; EC – economy.

Source: own



be greater than the items of other constructs that are in correlation with it. Thus, the data analyzed and reported in Tab. 5 disclosed that the study data has discriminant validity.

The data for this research is quantitative in nature, and *t*-statistics are used to determine the findings. The findings are tested with the structural equation modeling method. The *t*-values > 1.96 are acceptable for significant path (Hair et al., 2020). The study has

checked the *t*-values for the first path, and it is determined that climate change has a significant and positive impact on the economy ( $\beta = 0.334$ ,  $t = 4.630$ , and  $p = 0.000$ ). Similarly, the study has checked the *t*-values for the second path, and it is determined that climate change has a significant and positive impact on the environment ( $\beta = 0.199$ ,  $t = 2.931$ , and  $p = 0.004$ ). The results are described in Fig. 2 and Tab. 6.

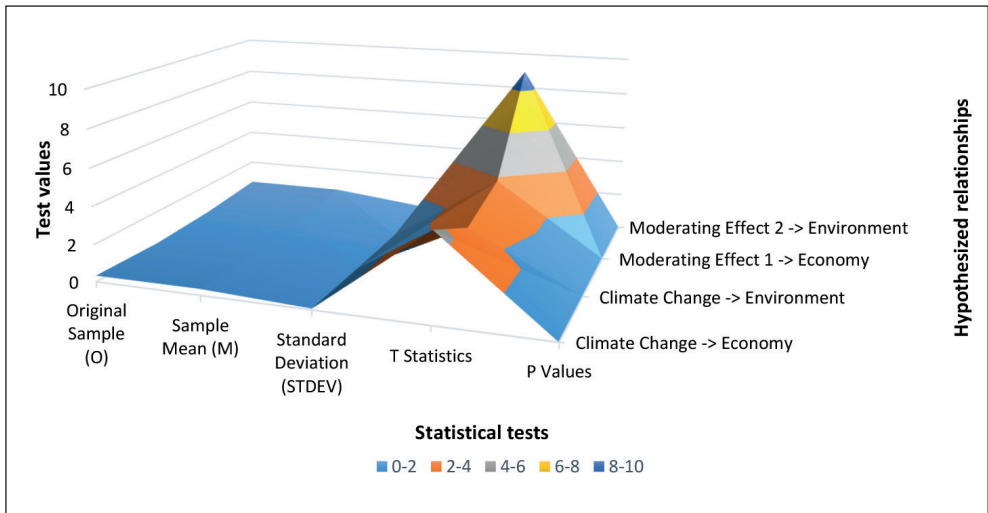


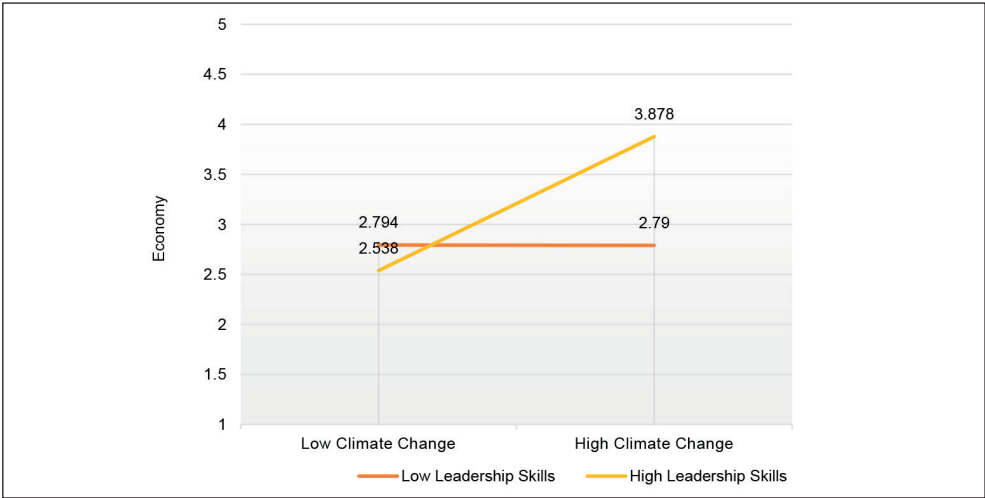
Fig. 2: Path findings

Source: own

Tab. 6: Path findings

Relationships	Original sample	Sample mean	Standard deviation	T-statistics	p-values
Climate change → economy	0.334	0.338	0.072	4.630	0.000
Climate change → environment	0.199	0.199	0.068	2.931	0.004
Moderating effect 1 → economy	0.336	0.335	0.088	3.835	0.000
Moderating effect 2 → environment	0.671	0.673	0.075	8.944	0.000

Source: own



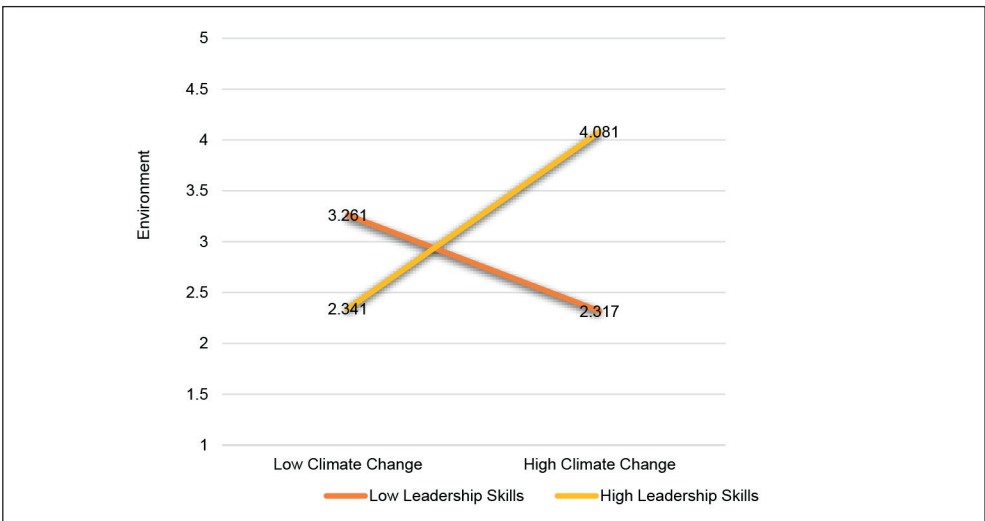
**Fig. 3: Moderating effect of leadership skills between climate change and economy**

Source: own

On the other hand, the  $t$ -values for the third path are checked, and it is determined that leadership skills have a significant and positive moderating impact between climate change and the economy ( $\beta = 0.336$ ,  $t = 3.835$ , and

$p = 0.000$ ). This moderation is strengthening the relationship between climate change and the economy (Fig. 3).

Finally, the  $t$ -values for the final path are checked, and it is determined that leadership



**Fig. 4: Moderating effect of leadership skills between climate change and environment**

Source: own

skills have a significant and positive moderating impact between climate change and the environment ( $\beta = 0.671$ ,  $t = 8.944$ , and  $p = 0.000$ ). This moderation is strengthening the relationship between climate change and the environment (Fig. 4).

### 3.2 Discussion

This research has used the findings of structural equation modeling to determine the paths. This model helps to find the  $t$ -values. The  $t$ -values above 1.96 are accepted for any relationship to become significant reported by Žuk and Szulecki (2020). In this way, hypothesis  $H1$  statistics show that there is a positive relationship between climate change and the economy. These findings are seen in light of the findings of existing studies. Balogun et al. (2020) reported that the more attention given to environmental issues, the more measures that everyone involved will take to alter it for the better. The essential solution to combating global warming can lead to a healthier environment and a sustainable future. Authorities must reduce the adverse effects of global warming while focusing on the growth of the economy. As a result of the unfavorable economic climate, global warming has a negative effect on the surroundings. Pettorelli et al. (2021) reported that poor environmental conditions can have a detrimental effect on a country's ability to support itself. To develop managerial skills properly, information availability is essential. Norouzi et al. (2020) reported that skills for leadership are needed to manage affairs and develop the economy as well as protect the environment. When the economic climate in a country is unstable, the resources available for economic expansion are useless. Nasir et al. (2019) reported that the ability to positively influence the environment may be made possible through access to the plans and efforts of the leadership. Leaders of industrialized countries are more focused on improving the economic situation. Leadership traits are seen to be suitable for economic growth.

Furthermore, hypothesis  $H2$  statistics show that there is a positive relationship between climate change and the environment. These findings are seen in light of the findings of existing studies. Sustainable leadership emerges as a promising model for effectively mitigating climate change impacts (Fragouli, 2020). Additionally, environmentally-specific

transformational leadership and leader's pro-environmental behaviors significantly influence employees' environmental passion and behaviors (Robertson & Barling, 2013). Environmentally-specific leadership and workplace pro-environmental behaviors affect employees' environmental passion and pro-environmental behaviors. Furthermore, leadership with environmental concerns can advocate for climate and environmental protection. Our findings underscore the importance of leadership in fostering organizational environmental responsibility and adapting to climate change. Improved management and tactical preparation can help the authorities address the pressing issues that must be resolved to enhance the state of the natural environment (Felix et al., 2022; Zheng et al., 2019). The effects of rising temperatures are disrupting the financial structures of developed nations. The aspect that must be taken into account to boost financial position is warming temperatures (Rehman et al., 2021). Both developed and developing countries are considered to be critically affected by the warming climate. The complex connection between environmental degradation and climate change poses significant threats, which needs to be addressed. Since the policies for climate change and the environment do not apply to only one country, the world's leaders must cooperate (Prideaux et al., 2020).

Thirdly, the  $t$ -values identified for hypothesis  $H3$  revealed that there is a positive moderating role of leadership skills between climate change and the economy. This relationship is new in the literature and at the infancy stage, but the findings of this relationship are supported by the existing study results. Leadership plays a crucial role in addressing climate change and its economic implications. Additionally, leadership's in-the-moment oversight of the activities execution can offer a technique to effectively reduce carbon emissions and protect the environment (Khan et al., 2019). Many citizens are ready to back initiatives to address challenges connected to global warming. The consequences of climate change on the world economy are considerable as there is a direct link between rising temperatures and the economy. To prevent the effects of climate change from harming the economy and companies, developed countries are concentrating on concerns associated with warming temperatures (Streletskiy et al., 2019). To protect the environment, greenhouse

gases in the atmosphere should be decreased over time. When acceptable measures are adopted, a sustainable environment is feasible. Regulations with a lasting impact may offer a better path forward for enhancing the natural environment and free it from unfavorable conditions (Nawaz et al., 2021). Focusing on reducing climate change can be a meaningful strategy for achieving sustainable development objectives. Slow environmental improvement and climate change mitigation measures may prove to be a less effective strategy for ensuring environmental sustainability (Sovacool, 2021). Natural hazards brought on by environmental disasters and other climate change-related catastrophes are intolerable for survival (Ehsanullah et al., 2021). Today's leaders are actively striving to enhance sustainability when they are genuine about advancing the fight against global warming.

Finally, the *t*-values identified for hypothesis *H4* revealed that there is a positive moderating role of leadership skills between climate change and the environment. This relationship is new in the literature and still at the infancy stage. However, some existing studies support the findings. The progress in the resolution of environmental problems depends on the sustainability of the climate. Leaders must address climate issues since they are responsible for policymaking (Markkanen & Anger-Kraavi, 2019). A step in the right direction for developing efforts to combat climate change is the support of the general public. Corporations may suffer due to the diminished attention given to world warming, and the interest of investors may also decline as a result (Dogru et al., 2019). The government's long-term policies, which are the main driver of environmental advancement, make it feasible for the environment to be sustained. A nation can increase its long-term viability by preserving its natural assets with the support of its residents' awareness of and commitment to better environmental conditions (Skovgaard & van Asselt, 2019). Therefore, improving and addressing climate change requires actions to maintain the ecosystem. In this respect, circular economy has strong potential to address environmental sustainability. However, it requires integration of environmental innovation, organizational learning, and stakeholder orientation. Leaders are needed to drive the adoption of circular economy principles in organizations. They can create sustainable

value for customers, investors, and the environment in order for the successful implementation of circular economy. Thus, leadership abilities positively influence the transition towards sustainability practices. Managerial decisions and actions play a crucial role in the path to sustainable performance. From the standpoint of leadership attributes to advance human behavior for the sake of management and leadership, the role of everyone involved cannot be ignored (Dale et al., 2020; Todorovic et al., 2024).

## Conclusions

**Theoretical and practical implications.** This research is theoretically important as the literature is extended by it. The study has introduced a newly developed relationship that had not been reported in existing studies. The relationship between climate change and the economy and environment as a whole has not been discussed in previous studies. Hence, this study has theoretical importance, as it has highlighted that climate change has a significant impact on the economy and environment. The direction of this relationship is positive, which has not been observed in existing studies. Therefore, the study has novel findings that are significant in the literature based on its critical outcomes.

Furthermore, this study also introduced two significant moderating relationships in the literature. First, the research suggested that leadership skills have a significant moderating impact on the relationship between climate change and the economy. The direction of this relationship is positive, and it is also statistically proven that the moderating impact of leadership skills is strengthening the relationship between climate change and the economy. Second, the research has shown that leadership skills have a significant moderating impact on the relationship between climate change and the environment. Furthermore, the direction of this relationship is positive, and it is also statistically proven that the moderating impact of leadership skills is strengthening the relationship between climate change and the environment.

Moreover, the research contributes to the concept of circular economy by enriching the literature with the findings displaying the complex relationship between climate change, environment, economy, and leadership. The circular economy is highly relevant for climate actions and environmental issues as circular economy strategies can reduce greenhouse gas

emissions, mitigate climate change, improve waste management, use resources efficiency, implement renewable energy, and achieve sustainable development. Leaders engage with a wide range of stakeholders, including employees, customers, suppliers, and communities, to build consensus and drive collective action towards circularity. Leadership, by setting the vision for a circular future within organizations and across industries, should develop strategies and roadmaps to guide the transition, outlining specific goals, targets, and timeline.

In addition, this research has significant practical implications that can be used to improve the economy. Climate has a significant impact on the business activities that contribute to the economy. Therefore, the leadership in each country are required to adopt the sustainable development goals to promote environmental protection and economic growth. Leadership performance can be improved by access to policy information. Furthermore, successful policy implementation with a reliable leadership strategy is the way forward to augment environmental stewardship. Effective leadership can become a supportive team for improving the environment.

The findings contribute to the practice of circular economy showcasing the important relationship between climate change, environment and economy, as well as the role of leadership in mitigating climate change and protecting the environment. By fostering sustainable practices and collaborative approaches, leaders can encourage circularity. The transition to a circular economy may require different leadership approaches with transformational and pro-environmental styles. This, in turn, will lead to improved economic results. In particular, the circular economy can contribute to climate change mitigation by reducing greenhouse gas emissions through more efficient resource utilization, promoting the use of renewable and recyclable materials, and minimizing waste generation. The transition to a circular economy requires a fundamental shift in mindsets, policies, and business practices, presenting an opportunity for visionary leadership at all levels of society. Leaders who embrace the principles of the circular economy and spearhead its implementation can serve as role models, inspiring others to follow suit and accelerate the transition towards a more sustainable future.

**Research limitations and future directions.** This research has used quantitative data and structural equation modeling. Despite its contribution, the research has some limitations that can be addressed by future studies. This study has collected cross-sectional data; however, data obtained using a longitudinal design may be valuable in determining the moderating impact of leadership skills on climate change, the economy, and the environment. Therefore, future studies can be based on longitudinal data to compare with the results of this study. This research has used a structural equation model for path findings, and future studies should be based on regression analysis to determine the findings. Although this study is based on the quantitative method that is appropriate for the research model, it has discussed only limited variables. Thus, future research can identify new factors that may contribute to economic and climate challenges. Furthermore, the transition to a circular economy requires research from different contexts in terms of countries, cultures, and industries.

## References

- Alarcón, D., Sánchez, J. A., & Olavide, U. (2015). Assessing convergent and discriminant validity in the ADHD-R IV rating scale: User-written commands for Average Variance Extracted (AVE), composite reliability (CR), and heterotrait-monotrait ratio of correlations (HTMT) [Presented paper]. *Spanish STATA Meeting*.
- Balogun, A.-L., Marks, D., Sharma, R., Shekhar, H., Balmes, C., Maheng, D., Arshad, A., & Salehi, P. (2020). Assessing the potentials of digitalization as a tool for climate change adaptation and sustainable development in urban centres. *Sustainable Cities and Society*, 53, 101888. <https://doi.org/10.1016/j.scs.2019.101888>
- Balsalobre-Lorente, D., Driha, O. M., Shahbaz, M., & Sinha, A. (2020). The effects of tourism and globalization over environmental degradation in developed countries. *Environmental Science and Pollution Research*, 27(7), 7130–7144. <https://doi.org/10.1007/s11356-019-07372-4>
- Barlat, F., Ha, J., Grácio, J. J., Lee, M.-G., Rauch, E. F., & Vincze, G. (2013). Extension of homogeneous anisotropic hardening model to cross-loading with latent effects. *International Journal of Plasticity*, 46, 130–142. <https://doi.org/10.1016/j.ijplas.2012.07.002>

Bos, K., & Gupta, J. (2019). Stranded assets and stranded resources: Implications for climate change mitigation and global sustainable development. *Energy Research & Social Science*, 56, 101215. <https://doi.org/10.1016/j.erss.2019.05.025>

Bradley, G. L., Babutsidze, Z., Chai, A., & Reser, J. P. (2020). The role of climate change risk perception, response efficacy, and psychological adaptation in pro-environmental behavior: A two nation study. *Journal of Environmental Psychology*, 68, 101410. <https://doi.org/10.1016/j.jenvp.2020.101410>

Christensen, R., & Knezek, G. (2015). The climate change attitude survey: Measuring middle school student beliefs and intentions to enact positive environmental change. *International Journal of Environmental and Science Education*, 10(5), 773–788.

Confetto, M. G., & Covucci, C. (2021). A taxonomy of sustainability topics: A guide to set the corporate sustainability content on the web. *The TQM Journal*, 33(7), 106–130. <https://doi.org/10.1108/tqm-06-2020-0134>

Covucci, C., Confetto, M. G., Ključnikov, A., & Panait, M. (2024). Unrevealing the nexus between digital sustainability and corporate digital responsibility: A dual-track systematic literature review towards a framework of corporate digital sustainability. *Technology in Society*, 79, 102743. <https://doi.org/10.1016/j.techsoc.2024.102743>

Dale, A., Robinson, J., King, L., Burch, S., Newell, R., Shaw, A., & Jost, F. (2020). Meeting the climate change challenge: Local government climate action in British Columbia, Canada. *Climate Policy*, 20(7), 866–880. <https://doi.org/10.1080/14693062.2019.1651244>

Dogru, T., Marchio, E. A., Bulut, U., & Suess, C. (2019). Climate change: Vulnerability and resilience of tourism and the entire economy. *Tourism Management*, 72, 292–305. <https://doi.org/10.1016/j.tourman.2018.12.010>

Ehsanullah, S., Tran, Q. H., Sadiq, M., Bashir, S., Mohsin, M., & Iram, R. (2021). How energy insecurity leads to energy poverty? Do environmental consideration and climate change concerns matters. *Environmental Science and Pollution Research*, 28(39), 55041–55052. <https://doi.org/10.1007/s11356-021-14415-2>

Felix, P., Mirela, P., Vasile, A. J., & Iza, G. (2022). Non-financial performance of energy companies listed on the Bucharest Stock Exchange and relevance for stakeholders.

In A. M. Dima & M. Kelemen (Eds.), *Digitalization and big data for resilience and economic intelligence* (pp. 183–201). Springer. [https://doi.org/10.1007/978-3-030-93286-2\\_14](https://doi.org/10.1007/978-3-030-93286-2_14)

Fragouli, E. (2020). Climate changes and leadership effectiveness: A sustainable leadership approach. *Journal of Economics and International Business Management*, 8(1), 1–14.

Gigauri, I. & Khan, A. J. (Eds.) (2025). *Navigating corporate social responsibility through leadership and sustainable entrepreneurship*. IGI Global. <https://doi.org/10.4018/979-8-3693-6685-1>

Gilfoyle, E., Gottesman, R., & Razack, S. (2007). Development of a leadership skills workshop in paediatric advanced resuscitation. *Medical Teacher*, 29(9–10), e276–e283. <https://doi.org/10.1080/01421590701663287>

Gold, A. H., Malhotra, A., & Segars, A. H. (2001). Knowledge management: An organizational capabilities perspective. *Journal of Management Information Systems*, 18(1), 185–214. <https://doi.org/10.1080/07421222.2001.11045669>

Gura, K. S., Nica, E., Kliestik, T., & Puime-Guillén, F. (2023). Circular economy in territorial planning strategy: Incorporation in cluster activities and economic zones. *Environmental Technology and Innovation*, 32, 103357. <https://doi.org/10.1016/j.eti.2023.103357>

Hair, J. F., Howard, M. C., & Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *Journal of Business Research*, 109, 101–110. <https://doi.org/10.1016/j.jbusres.2019.11.069>

Hart, J., & Pomponi, F. (2021). A circular economy: Where will it take us? *Circular Economy and Sustainability*, 1(1), 127–141. <https://doi.org/10.1007/s43615-021-00013-4>

Hoang, S. D., Dey, S. K., Tučková, Z., & Pham, T. P. (2023). Harnessing the power of virtual reality: Enhancing telepresence and inspiring sustainable travel intentions in the tourism industry. *Technology in Society*, 75, 102378. <https://doi.org/10.1016/j.techsoc.2023.102378>

Howarth, C., Bryant, P., Corner, A., Fankhauser, S., Gouldson, A., Whitmarsh, L., & Willis, R. (2020). Building a social mandate for climate action: Lessons from COVID-19. *Environmental and Resource Economics*, 76(4), 1107–1115. <https://doi.org/10.1007/s10640-020-00446-9>

Hussain, M., Butt, A. R., Uzma, F., Ahmed, R., Irshad, S., Rehman, A., & Yousaf, B. (2020). A comprehensive review of climate

- change impacts, adaptation, and mitigation on environmental and natural calamities in Pakistan. *Environmental Monitoring and Assessment*, 192(1), 1–20. <https://doi.org/10.1007/s10661-019-7956-4>
- Iqbal, N., Abbasi, K. R., Shinwari, R., Guangcai, W., Ahmad, M., & Tang, K. (2021). Does exports diversification and environmental innovation achieve carbon neutrality target of OECD economies? *Journal of Environmental Management*, 291, 112648. <https://doi.org/10.1016/j.jenvman.2021.112648>
- Jeswani, H., Krüger, C., Russ, M., Horlacher, M., Antony, F., Hann, S., & Azapagic, A. (2021). Life cycle environmental impacts of chemical recycling via pyrolysis of mixed plastic waste in comparison with mechanical recycling and energy recovery. *Science of The Total Environment*, 769, 144483. <https://doi.org/10.1016/j.scitotenv.2020.144483>
- Kaur, M., Palazzo, M., & Foroudi, P. (2024). Circular supply chain management in post-pandemic context. A qualitative study to explore how knowledge, environmental initiatives and economic viability affect sustainability. *Qualitative Market Research: An International Journal*, 27(4), 572–607. <https://doi.org/10.1108/qmr-10-2023-0140>
- Khan, A. J., Ul Hameed, W., Iqbal, J., Shah, A. A., Tariq, M. A. U. R., & Ahmed, S. (2022). Adoption of sustainability innovations and environmental opinion leadership: A way to foster environmental sustainability through diffusion of innovation theory. *Sustainability*, 14(21), 14547. <https://doi.org/10.3390/su142114547>
- Khan, S. A. R., Sharif, A., Golpîra, H., & Kumar, A. (2019). A green ideology in Asian emerging economies: From environmental policy and sustainable development. *Sustainable Development*, 27(6), 1063–1075. <https://doi.org/10.1002/sd.1958>
- Leal Filho, W., Frizzo, K., Eustachio, J. H. P. P., Tsani, S., & Özuyar, P. G. (2024). Integrating climate change practices in a circular economy context – The perspective from chemical enterprises. *Sustainable Development*, 32(3), 2489–2505. <https://doi.org/10.1002/sd.2796>
- Ma, W., Khan, A. J., Fayyaz, S., Curle, S., & Gigauri, I. (2024). Am I safe at my educational place? Creating secure and sustainable urban learning spaces through green infrastructure and ecological education. *Education and Urban Society*, 56(9), 1118–1141. <https://doi.org/10.1177/00131245241249980>
- Maja, M. M., & Ayano, S. F. (2021). The impact of population growth on natural resources and farmers' capacity to adapt to climate change in low-income countries. *Earth Systems and Environment*, 5(2), 271–283. <https://doi.org/10.1007/s41748-021-00209-6>
- Markkanen, S., & Anger-Kraavi, A. (2019). Social impacts of climate change mitigation policies and their implications for inequality. *Climate Policy*, 19(7), 827–844. <https://doi.org/10.1080/14693062.2019.1596873>
- Mohsin, M., Taghizadeh-Hesary, F., Panthamit, N., Anwar, S., Abbas, Q., & Vo, X. V. (2021). Developing low carbon finance index: Evidence from developed and developing economies. *Finance Research Letters*, 43, 101520. <https://doi.org/10.1016/j.frl.2020.101520>
- Nasir, M. A., Duc Huynh, T. L., & Xuan Tram, H. T. (2019). Role of financial development, economic growth & foreign direct investment in driving climate change: A case of emerging ASEAN. *Journal of Environmental Management*, 242, 131–141. <https://doi.org/10.1016/j.jenvman.2019.03.112>
- Nawaz, M. A., Seshadri, U., Kumar, P., Aqdas, R., Patwary, A. K., & Riaz, M. (2021). Nexus between green finance and climate change mitigation in N-11 and BRICS countries: Empirical estimation through difference in differences (DID) approach. *Environmental Science and Pollution Research*, 28(6), 6504–6519. <https://doi.org/10.1007/s11356-020-10920-y>
- Noordin, T. A., & Sulaiman, S. (2010). The status on the level of environmental awareness in the concept of sustainable development amongst secondary school students. *Procedia – Social and Behavioral Sciences*, 2(2), 1276–1280. <https://doi.org/10.1016/j.sbspro.2010.03.187>
- Norouzi, N., Zarazua de Rubens, G., Choupanpiesheh, S., & Enevoldsen, P. (2020). When pandemics impact economies and climate change: Exploring the impacts of COVID-19 on oil and electricity demand in China. *Energy Research & Social Science*, 68, 101654. <https://doi.org/10.1016/j.erss.2020.101654>
- Pettorelli, N., Graham, N. A. J., Seddon, N., Maria da Cunha Bustamante, M., Lowton, M. J., Sutherland, W. J., Koldewey, H. J., Prentice, H. C., & Barlow, J. (2021). Time to integrate global climate change and biodiversity science-policy agendas. *Journal of Applied Ecology*, 58(11), 2384–2393. <https://doi.org/10.1111/1365-2664.13985>
- Pham, N. M., Huynh, T. L. D., & Nasir, M. A. (2020). Environmental consequences

of population, affluence and technological progress for European countries: A Malthusian view. *Journal of Environmental Management*, 260, 110143. <https://doi.org/10.1016/j.jenvman.2020.110143>

Prideaux, B., Thompson, M., & Pabel, A. (2020). Lessons from COVID-19 can prepare global tourism for the economic transformation needed to combat climate change. *Global Tourism and COVID-19*, 22(3), 667–678.

Rahman, M. M., Khan, I., Field, D. L., Techato, K., & Alameh, K. (2022). Powering agriculture: Present status, future potential, and challenges of renewable energy applications. *Renewable Energy*, 188, 731–749. <https://doi.org/10.1016/j.renene.2022.02.065>

Rehman, A., Ma, H., Ahmad, M., Irfan, M., Traore, O., & Chandio, A. A. (2021). Towards environmental Sustainability: Devolving the influence of carbon dioxide emission to population growth, climate change, forestry, livestock and crops production in Pakistan. *Ecological Indicators*, 125, 107460. <https://doi.org/10.1016/j.ecolind.2021.107460>

Robertson, J. L., & Barling, J. (2013). Greening organizations through leaders' influence on employees' pro-environmental behaviors. *Journal of Organizational Behavior*, 34(2), 176–194. <https://doi.org/10.1002/job.1820>

Royston, P. (1992). Which measures of skewness and kurtosis are best? *Statistics in Medicine*, 11(3), 333–343. <https://doi.org/10.1002/sim.4780110306>

Shahzad, U. (2020). Environmental taxes, energy consumption, and environmental quality: Theoretical survey with policy implications. *Environmental Science and Pollution Research*, 27(20), 24848–24862. <https://doi.org/10.1007/s11356-020-08349-4>

Sheller, M. (2021). Reconstructing tourism in the Caribbean: Connecting pandemic recovery, climate resilience and sustainable tourism through mobility justice. *Journal of Sustainable Tourism*, 29(9), 1436–1449. <https://doi.org/10.1080/09669582.2020.1791141>

Shevlin, M., & Miles, J. N. V. (1998). Effects of sample size, model specification and factor loadings on the GFI in confirmatory factor analysis. *Personality and Individual Differences*, 25(1), 85–90. [https://doi.org/10.1016/s0191-8869\(98\)00055-5](https://doi.org/10.1016/s0191-8869(98)00055-5)

Skovgaard, J., & van Asselt, H. (2019). The politics of fossil fuel subsidies and their reform: Implications for climate change mitigation.

*WIREs Climate Change*, 10(4), 581. <https://doi.org/10.1002/wcc.581>

Sovacool, B. K. (2021). Who are the victims of low-carbon transitions? Towards a political ecology of climate change mitigation. *Energy Research & Social Science*, 73, 101916. <https://doi.org/10.1016/j.erss.2021.101916>

Srivastava, S., Dey, S. K., Sharma, S., & Ratilla, M. (2023). Adoption of sustainable practices by Asian hotels: Gaps in academia. *Worldwide Hospitality and Tourism Themes*, 15(3), 220–230. <https://doi.org/10.1108/whatt-01-2023-0009>

Stoian Bobalca, I. C., Clipa, R. I., Ifrim, M., & Lungu, A. E. (2023). Perception regarding European Green Deal challenges: From environment to competition and economic costs. *E&M Economics and Management*, 26(3), 4–19. <https://doi.org/10.15240/tul/001/2023-3-001>

Streletskiy, D. A., Suter, L. J., Shiklomanov, N. I., Porfiriev, B. N., & Eliseev, D. O. (2019). Assessment of climate change impacts on buildings, structures and infrastructure in the Russian regions on permafrost. *Environmental Research Letters*, 14(2), 025003. <https://doi.org/10.1088/1748-9326/aaf5e6>

Suieubayeva, S., Sánchez-García, E., Martínez-Falcó, J., Marco-Lajara, B., Sadenova, A., & Montalvo-Falcón, J. V. (2025). Green leaders and global change: Uncovering the drivers of corporate environmental sustainability. *Environmental Development*, 54, 101148. <https://doi.org/10.1016/j.envdev.2025.101148>

Taiwo, M. A., Ayodeji, A. M., & Yusuf, B. A. (2012). Impact of small and medium enterprises on economic growth and development. *American Journal of Business and Management*, 1(1), 18–22. <https://doi.org/10.11634/21679606170644>

Tariq, M. A. U. R., van de Giesen, N., Janjua, S., Shahid, M. L. U. R., & Farooq, R. (2020). An engineering perspective of water sharing issues in Pakistan. *Water*, 12(2), 477. <https://doi.org/10.3390/w12020477>

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53–55. <https://doi.org/10.5116/ijme.4dfb.8dfd>

Todorovic, M., Cupic, M., & Jovanovic, D. (2024). Managers' attitudes as a critical success factor of kaizen. *E&M Economics and Management*, 27(2), 69–86. <https://doi.org/10.15240/tul/001/2024-2-005>



Yousaf, Z., Palazzo, M., Radulescu, M., & Javed, A. (2023). Unleashing the role of greenwashing in the relationship of environmental sustainability thoughts and environmental performance: Exploring the importance of generative leadership. *Environment, Development and Sustainability*, 1–20. <https://doi.org/10.1007/s10668-023-03473-w>

Zheng, X., Streimikiene, D., Balezentis, T., Mardani, A., Cavallaro, F., & Liao, H. (2019). A review of greenhouse gas emission

profiles, dynamics, and climate change mitigation efforts across the key climate change players. *Journal of Cleaner Production*, 234, 1113–1133. <https://doi.org/10.1016/j.jclepro.2019.06.140>

Żuk, P., & Szulecki, K. (2020). Unpacking the right-populist threat to climate action: Poland's pro-governmental media on energy transition and climate change. *Energy Research & Social Science*, 66, 101485. <https://doi.org/10.1016/j.erss.2020.101485>