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Tourism Enterprise's Level of Climate Action Literacy and Measuring, Monitoring and Reporting of Emissions

Abstract

This paper examines the critical issue of decarbonising emissions in the tourism industry, aiming for a 51% reduction by 2030 and Net-Zero emissions by 2050. It focuses on climate action literacy and the level of engagement by tourism enterprises in emissions monitoring and reporting. The study uses a quantitative research tool developed through desk-based research to investigate tourism enterprises' climate action practices. The key finding is that while enterprises have sufficient climate action knowledge, there is a significant gap in applying this knowledge, particularly in the regular measurement, monitoring, and reporting of emissions. The study highlights the need for targeted upskilling and training to enable enterprises to decarbonise effectively. It also emphasises the importance of supporting tourism enterprises in measuring their environmental impact, assessing sustainability, and contributing to climate change mitigation efforts.

Keywords: climate action literacy, decarbonisation, tourism emissions, Net-Zero, sustainable destination management and development

1. Introduction

This paper evaluates the extent of climate action literacy among tourism enterprises and their practices in measuring, monitoring, and reporting emissions from tourism operations. Integrating climate action into tourism policies, plans, and strategies is now crucial for sustainable development and effective management at the global level (OPSTP [One Planet Sustainable Tourism Programme], 2020). Moreover, under the European Union's new Corporate Sustainability Reporting Directive (2022), European Member States must report on their environmental and social impacts (EC [European Commission], 2023).

The relationship between tourism, the environment, and climate change is complex and bi-directional, requiring nuanced approaches to address its impacts. In response, the United Nations established the 17 Sustainable Development Goals (SDGs) to address issues like poverty, sustainability, and global prosperity (United Nations, 2023). Previous research highlights the importance of multi-stakeholder engagement in achieving the SDGs (Trang Nguyen & Huong Hoang, 2023). Specifically, SDG 13, focusing on Climate Action, provides guidelines, targets, and indicators that destinations can adopt to align with national priorities and tackle the global environmental crisis. This underscores the critical role of tourism enterprises in engaging with climate action to help achieve these global goals.

In this context, literacy refers to the knowledge and competence in a specific area, such as climate action, which involves understanding the principles and practices required to mitigate climate change. Scholars in tourism have emphasised that effective climate action depends on widespread climate and sustainability literacy

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among industry stakeholders (Johnston, 2018; Kolenatý, Kroufek & Činčera, 2022; Fuchs, 2023). While literacy typically involves applying knowledge to change behaviours and practices, some researchers argue that knowledge alone is insufficient to address the complexities of climate change (Becken & Coghlan, 2022).

Recent studies emphasise that the first critical step in climate action for the tourism sector is the regular measurement and reporting of emissions from tourism operations (OPSTP, 2020; Becken & Higham, 2021; Sun et al., 2022; Conefrey & Hanrahan, 2022a; UNWTO [United Nations World Tourism Organization], 2022a; UNWTO, 2022b). Without this, tourism operations cannot be considered sustainable, as progress toward decarbonisation must be actively monitored annually (Scott, 2021a; Scott, 2021b; Conefrey & Hanrahan, 2022b). Therefore, tourism stakeholders must collaborate and improve education and public understanding of climate change to gain support for climate action and drive the industry's transition to net zero emissions.

This study focused on climate action literacy and monitoring tourism emissions, contributing to the field in two key ways. First, it applies a theoretical framework of indicators based on prior research and global guidelines, including those from the United Nations (UN), the UN World Tourism Organization (UNWTO), and the United Nations Sustainable Development Goals (UNSDGs), to assess climate action within the tourism sector. This framework establishes a basis for examining the gaps between the theoretical principles of climate action and their practical application within tourism enterprises.

Second, the study highlights the crucial role of a skilled workforce in achieving successful decarbonisation and facilitating the transition to Net-Zero emissions in the tourism industry. By focusing on the importance of training and capacity-building, the research underscores the need for a knowledgeable workforce equipped with the practical skills necessary to implement climate action strategies effectively.

Based on the findings, evidence-informed decisions can be made to identify areas where tourism enterprises require upskilling and training to contribute effectively to a decarbonised world. The approach outlined in this paper provides a practical framework that destinations can replicate to assess and measure tourism enterprises' commitment to climate action globally. This tool offers valuable insights for policymakers, practitioners, and industry leaders. It enables them to identify gaps in climate action literacy and prioritise capacity-building efforts, ensuring the sector's successful transition to sustainability and Net-Zero emissions.

The remainder of the article is structured as follows: Section 2 reviews the theoretical and empirical literature on climate action, tourism emissions, and the challenges in achieving Net-Zero emissions. Section 3 outlines the framework and methodology used in the study. Section 4 discusses the main results of the research. Finally, Section 5 provides key insights and recommendations for future action.

2. Literature review

Tourism is an interdisciplinary, labour-intensive industry with high turnover and inherent uncertainty, making it particularly vulnerable to adverse impacts (López-Bonilla & López-Bonilla, 2012). Given its complexity, a skilled workforce capable of critical thinking, adapting to change, and mitigating environmental, social, and economic impacts is essential (Septyandi & Prawira, 2022). Therefore, destinations must regularly assess workforce upskilling and training needs to meet sustainability goals and support transitioning to a more sustainable and resilient tourism industry.

2.1. The importance of climate action literacy

Building knowledge is crucial for the tourism industry to address the climate crisis and transition to Net-Zero emissions by 2050. While the literature on tourism sustainability and the United Nations Sustainable Development Goals (UNSDGs) is expanding, many studies highlight a significant gap in climate action

awareness. There is a widespread lack of understanding about climate action within the tourism sector and society at large (Johnston, 2018; Kolenatý et al., 2022; Carlisle et al., 2022; Conefrey & Hanrahan, 2022a; Becken & Coghlan, 2022; Manumpil et al., 2023; Conefrey et al., 2024). This lack of awareness hinders sustainability goals and delays practical climate change mitigation efforts across industries.

Climate change can hinder the achievement of multiple interconnected United Nations Sustainable Development Goals (UNSDGs). To effectively meet these goals, climate change literacy is crucial at individual, institutional, and societal levels (Milěř & Sládek, 2011; Johnston, 2018). Specifically, Target 3 of Goal 13 (Climate Action) calls for "building knowledge and capacity to meet climate change" (UN, 2023). This target highlights the need for improved education and awareness of climate change mitigation, adaptation, impact reduction, and early warning systems (Fuchs, 2023). Such knowledge is essential for empowering communities, organisations, and governments to take informed, proactive actions toward climate change and sustainable development.

Researchers argue that while knowledge is a critical driver for climate action, a basic understanding of climate change alone is insufficient to inspire meaningful change. It is essential also to foster emotional engagement, allowing individuals to connect with the issue and translate their knowledge into concrete action (Becken & Coghlan, 2022; Conefrey et al., 2024). Therefore, enhancing climate action literacy within the tourism industry requires a more holistic approach, combining cognitive understanding and emotional involvement. This integrated strategy can drive sustainable practices and inspire proactive climate action across the sector.

Climate action literacy is essential for understanding how to mitigate and adapt to the disruptions caused by climate change (Milěř & Sládek, 2011). As highlighted by Johnston (2018) and Kolenatý et al. (2022), it includes several competencies, such as:

1. *Knowledge of climate system science and its importance*
2. *Understanding the impacts and challenges of climate change*
3. *Motivation to make informed decisions for mitigation and adaptation*
4. *Skills in systems thinking and communicating climate change*

This literacy supports informed decision-making and fosters the development of context-specific tourism and climate policies. Given the diversity of challenges across destinations, climate action strategies must be tailored to local contexts to be effective.

2.2. Tourism emissions and the challenge to Net-Zero

With decades of tourism growth, the sector has generated billions of tons of emissions annually. 2019 global tourism emitted 5.4 GtCO₂eq, excluding aviation's non-CO₂ effects (Gössling et al., 2023). Tourism leaders have stressed the urgent need to decarbonise emissions to reduce costs and improve the competitive edge of enterprises and destinations (WTTC [World Travel & Tourism Council], 2021).

However, it remains clear that few tourism enterprises actively measure their emissions (UNWTO, 2023). This gap, compounded by the sector's complex value chain and diverse operations, presents a significant climate action challenge (Scott, 2021a; Loehr & Becken, 2021; Gössling et al., 2023). Effective measurement and management of emissions are essential for driving meaningful climate action and achieving sustainability goals in tourism.

Previous studies highlight that translating climate action theory into practice within the tourism sector remains inadequate. Many tourism policies and plans either lack or fail to contribute effectively to climate action efforts (Scott, 2021a; 2021b; Conefrey & Hanrahan, 2022a). Additionally, the lack of systematic methods

for measuring and reporting emissions remains a significant barrier to developing evidence-based, location-specific decarbonisation strategies (Gössling & Scott, 2018; Sun et al., 2020; Conefrey & Hanrahan, 2022b). Therefore, it is crucial for tourism destinations to actively measure, monitor, and report emissions to support the transition toward Net-Zero emissions by 2050. Emissions data also allows government bodies to compare tourism-related emissions with those of other industries and destinations, enabling informed policy decisions and progress tracking towards sustainability goals.

The literature identifies several methods for measuring emissions from tourism operations, including consultants, carbon calculators, toolkits, and more comprehensive approaches such as the bottom-up method, life cycle analysis, top-down input-output method, and hybrid methods that combine these approaches (Sun, 2014; Sharp et al., 2016; Becken & Higham, 2021; UNWTO, 2023). Each method has advantages, limitations, and barriers to implementation (Conefrey & Hanrahan, 2022a). The environmentally extended input-output life cycle analysis is considered the most accurate, using actual tourism activity and expenditure data to measure emissions.

Despite its accuracy, the implementation of the environmentally extended input-output life cycle analysis faces barriers, particularly when destinations lack Tourism Satellite Accounts (TSAs) to track tourism demand for goods and services (Sun, 2014; Conefrey & Hanrahan, 2022a; Sun et al., 2022). This is often due to insufficient data, which hinders the application of this method. To overcome this challenge, collaboration among tourism policymakers, planners, enterprises, academics, and tourists is essential to address data gaps globally. Such cooperation would enable destinations to adopt a unified methodology for measuring, monitoring, reporting, and comparing tourism emissions, thus supporting global climate action efforts.

Consistent measurements of emissions from tourism operations are crucial for tracking monthly and annual decarbonisation progress (Conefrey & Hanrahan, 2022a). Tourism is a carbon-intensive industry generating direct, indirect, and induced emissions. Direct emissions (Scope 1) stem from activities like transportation, food, and accommodation (Yang et al., 2022), including fuel combustion, process emissions, and fugitive emissions (Sharp et al., 2016). Indirect emissions (Scope 2) often surpass direct emissions, covering the emissions embedded in goods purchased by tourists, such as the production and transportation of goods (Dwyer et al., 2010; Yang et al., 2022). Induced emissions (Scope 3) refer to emissions from the manufacturing and delivery of purchased goods and services, such as food production or souvenir manufacturing (Sharp et al., 2016).

Many studies exclude indirect and induced emissions due to challenges in obtaining data and assigning responsibility across the value chain (Sun, 2014; Sharp et al., 2016; Conefrey & Hanrahan, 2022a; UNWTO, 2023). Therefore, raising environmental impact reporting standards is essential to enable tourism enterprises to accurately monitor and report all emission sources. This comprehensive approach would better understand tourism's carbon footprint and inform more effective strategies to achieve decarbonisation goals.

3. Methodology

The framework developed in this study highlights the need for a skilled workforce capable of accurately measuring, monitoring, and reporting tourism emissions (Septyandi & Prawira, 2022). The framework aims to optimise evidence-based decarbonisation practices and support the transition to Net-Zero emissions by ensuring that tourism enterprises have sufficient climate action literacy. The study's primary goal was to establish a foundational framework for assessing tourism enterprises' climate action literacy and emissions monitoring and reporting capacity. This structured approach helps identify gaps in knowledge and practices, enabling targeted interventions to enhance sustainability efforts within the tourism sector.

3.1. Study framework

The study began with desk-based research to develop a theoretical framework for assessing tourism enterprises' commitment to climate action. This framework comprised 17 criteria from an extensive academic literature review on climate action and emissions in tourism operations (Table 1-2). These criteria provided the basis for evaluating the level of climate action literacy and the extent to which tourism enterprises were actively involved in measuring, monitoring, and reporting their emissions—the framework aimed to offer a structured, evidence-based approach for assessing climate-related practices within the tourism sector.

A theoretical framework was developed to support the creation of a quantitative research tool designed for easy replication at a national level. This tool tracks tourism enterprises' climate action literacy and their efforts in monitoring and reporting emissions. Drawing from previous research and key global guidelines (Tables 1 and 2), it incorporates resources such as the UNWTO Global Climate Action in Tourism survey (UNWTO, 2022a), the Sustainable Development Goals (UN, 2023), and the Global Sustainable Tourism Council (GSTC) criteria (GSTC, 2022a; 2022b). These sources provide essential benchmarks for evaluating tourism enterprises' climate action practices, offering a comprehensive structure for measuring their contributions to decarbonisation and sustainability.

Universal criteria are essential for tracking tourism enterprises' climate action literacy, providing a foundation for sustainable destination management and development (Table 1). Ongoing academic focus is needed to develop a skilled workforce to mitigate climate impacts. As highlighted by the UN, the key step towards decarbonisation is the regular measurement, monitoring, and reporting of emissions. This practice tracks progress, ensures contributions to global sustainability goals, and supports the transition to Net-Zero emissions, fostering accountability and informed decision-making.

Table 1
Criteria to measure tourism enterprises provision in climate action literacy

Do you understand the term climate change?
Do you understand the term carbon emissions?
Do you agree that carbon emissions have an impact on climate change?
Do you understand the term decarbonisation?
Do you understand the term Net-Zero destination?
Which term you are least familiar with: Decarbonisation, Net-Zero destination, or Climate-neutral
Are you aware that Ireland is expected to achieve a 51% reduction in emissions by 2030?
Are you aware that Ireland is aiming to reach Net-Zero emissions by no later than 2050?
Do you agree that the tourism industry should play an active role in helping to reduce carbon emissions?
Do you agree that climate change will impact the future of the tourism industry?

Source: adapted from (Becken & Dolnicar, 2015; Mei, 2017; Scott & Gössling, 2018; Cambridge Institute for Sustainability Leadership (CISL), 2020; Matemilola & Salami, 2021; Loehr & Becken, 2021; Gössling & Higham, 2021; Scott & Gössling, 2022; UN, 2023; Conefrey et al., 2024).

Table 2 outlines the universal criteria for assessing the current state of tourism enterprises' engagement with emissions management within a destination. These criteria help determine how much tourism enterprises monitor emissions and contribute to decarbonisation efforts. It is essential to recognise that these universal criteria (outlined in Table 2) are necessary for understanding the level of participation in emissions monitoring, which is crucial for tracking the progress of decarbonisation on an annual basis. By using these criteria, destinations can gain valuable insights into how effectively tourism enterprises manage their environmental impacts and identify areas for improvement in their sustainability practices.

Table 2
Criteria to monitor tourism enterprises measuring emissions

Is your enterprise measuring carbon emissions from your tourism operations?
How is your enterprise measuring emissions?
How often does your enterprise measure emissions?
What emission sources are included in your measurement?
Is your enterprise disclosing information about emissions from your tourism operations?
What were the total emissions from your enterprise in 2019?
Would you like training to measure, monitor, and report your enterprises' emissions?

Source: adapted from (Becken & Dolnicar, 2015; Sustainable Hospitality Alliance (SHA), 2017; Scott & Gössling, 2018; Caritte, 2020; Sun, Lin & Higham, 2020; OPSTP, 2020; UNWTO, 2021; Gössling & Higham, 2021; Carlisle et al., 2022; Department of the Environment, Climate and Communications (DECC), 2023; UN, 2023; Conefrey et al., 2024).

Assessing emissions from tourism operations is complex but crucial for destinations to meet mandatory emission reduction targets and corporate sustainability reporting standards set by the European Commission (EC, 2023). Accurate measurement and monitoring of tourism-related emissions are essential for ensuring compliance with these targets, enabling transparent reporting, and tracking progress toward decarbonisation goals. Without a structured approach to emissions assessment, destinations may struggle to meet obligations and fail to demonstrate significant improvement in their sustainability efforts.

3.2. Research method and design

A smart quantitative research analysis tool was developed based on the theoretical framework and implemented through a case study approach. The tool included seventeen closed-ended questions with drop-down menus for respondents alongside open-ended questions for additional insights. Çakar and Aykol (2020) note that a case study approach is practical for exploring under-examined phenomena or lack sufficient empirical evidence, such as climate action in tourism. This methodology enables a deeper understanding of how tourism enterprises engage with climate action and helps address gaps in current knowledge about sustainability practices in the sector.

The developed framework can be implemented globally to assess tourism enterprises at a national scale and determine the necessary upskilling and training for a decarbonised world. To illustrate the tool's application, a national case study was conducted in Ireland. Despite the importance of tourism emissions and decarbonisation practices, their environmental impact remains underexplored globally (Conefrey & Hanrahan, 2022a; Conefrey et al., 2024). Since European Member States must reduce emissions by 51% by 2030 and achieve zero by 2050, the Irish case study provides valuable insights into current efforts. It underscores the need for ongoing improvements in sustainability practices within the tourism sector.

Under international agreements, Ireland is committed to the National Climate Action and Low Carbon (Amended) Act 2021 (Jensen, 2021). In 2019, Irish tourism produced 11.62 MtCO₂eq, but significant gaps in tourism data collection and distribution were identified, a common challenge across many studies (Conefrey & Hanrahan, 2022b). To address these gaps, the European Union introduced the "Corporate Sustainability Reporting Directive" in 2022, requiring large enterprises to report on their environmental and social impacts (EC, 2023). This directive is part of the European Green Deal, which aims to make the EU the first climate-neutral continent. Consequently, all enterprises, including those in tourism, must accelerate environmental reporting, close data gaps, and implement evidence-based decarbonisation strategies. This paper focuses on developing a framework to assess tourism enterprises' climate action literacy and their capacity to monitor and report tourism emissions, ensuring alignment with global sustainability objectives and contributing to Ireland's and the EU's decarbonisation goals.

3.3. Sample

The Institute Research Ethics Committee (IREC) granted this study's ethical approval to ensure compliance with national and international ethical guidelines. A stratified purposeful sampling technique was employed in 2022 to capture a broad range of variations within tourism enterprises at the national level (Table 3). Participants received an information sheet detailing the study's aims and methods and were required to provide informed consent. Data was collected through face-to-face questionnaires, with some respondents completing the surveys electronically due to time constraints (Appendix 1). The sample included 600 tourism enterprises, with a rejection rate of 5 out of 6, yielding a 95% confidence level and a margin of error of 10%. This robust sampling approach ensured the results were representative and statistically reliable, providing valuable insights into climate action literacy and emissions reporting within the tourism sector.

Table 3
Sample variations of tourism enterprises assessed

Criteria	Results (%)
<i>Variations of the multi-sectoral tourism industry</i>	
Accommodation	40%
Activity provider/ tour operator	6%
Attraction	10%
Consultancy	1%
Food and Beverages	23%
Retail	6%
Transport	14%
<i>Variations in the enterprise's number of full-time employees</i>	
0-9	37%
10-19	24%
20-49	14%
50-99	18%
100-199	3%
200+	4%

Data from diverse tourism enterprises is essential for assessing the industry's commitment to climate action. Including various stakeholders, such as accommodation providers, transport services, tour operators, and others, allows for a comprehensive evaluation of the sector's engagement with climate action. This holistic approach ensures that the findings reflect the industry's readiness and capacity to contribute to climate mitigation and decarbonisation efforts. It also helps identify gaps and opportunities for improving sustainability practices across all tourism areas.

3.4. Data analysis

The data collected was entered into a data analysis tool to identify similarities and differences across tourism enterprises. A thematic analysis was applied to the qualitative responses, capturing insights into the industry's challenges and practices related to climate action. The data was mapped onto graphs representing the timelines for 2022 (the current state) and 2028 (when all enterprises will be legally required to report on sustainability), as shown in Tables 4-5. This approach tracked the level of climate action literacy and emissions monitoring participation within the industry and across different destinations. The study aims to assess the sector's progress in adapting to sustainability requirements and identify areas for improvement to meet future legal obligations and global climate goals.

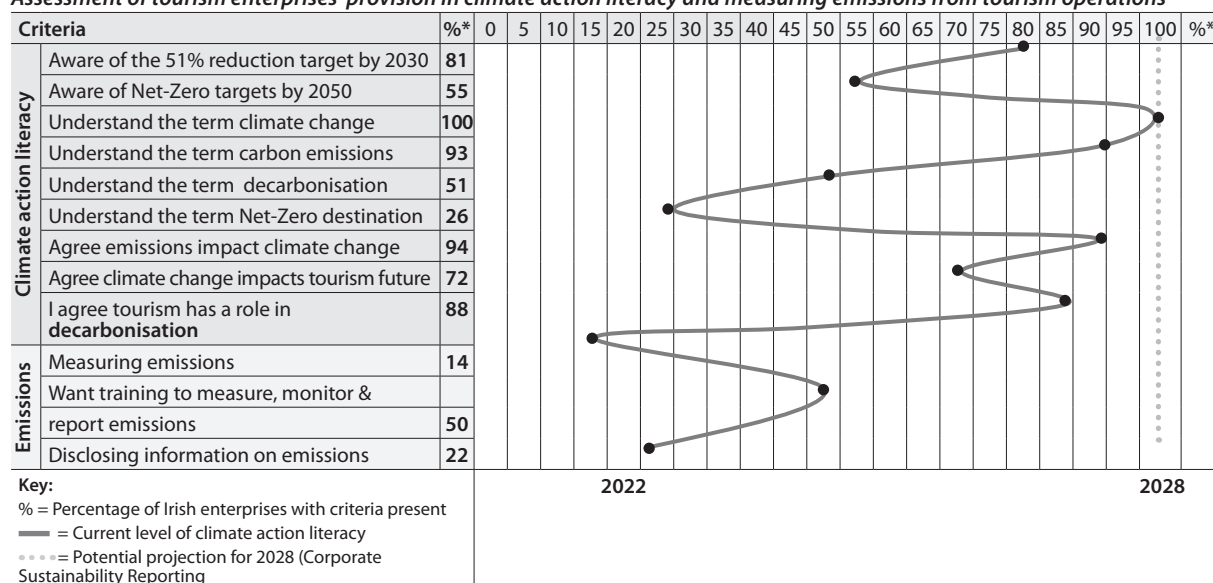
For consistent comparison, the data collected was inputted into a data analysis tool to identify any similarities or differences between the tourism enterprises. Additionally, a thematic analysis was applied to the survey

sections that allowed respondents to provide qualitative data, helping to capture nuanced insights into the industry's challenges and practices related to climate action. The data was then mapped onto a graph with timelines for 2022 (representing the current state of play) and 2028 (when all enterprises will be legally obliged to participate in sustainability reporting), as shown in Tables 4-5. This approach was used to track the level of climate action literacy and monitor the degree of participation in measuring and reporting tourism emissions over time, both within the tourism industry and across different destinations. By examining this progression, the study aims to assess how well the sector adapts to sustainability requirements and what improvements are needed to meet future legal obligations and global climate goals.

4. Results and discussion

To assess a destination's progress towards decarbonisation and support its transition to net zero by 2050, tourism enterprises were evaluated on their climate action literacy and their efforts in measuring, monitoring, and reporting emissions. Initial findings indicated that while tourism enterprises generally understand the emission reduction targets for 2030, there is a significant gap in awareness regarding the Net-Zero target for 2050 (Table 4). This suggests that while enterprises are aware of short-term goals, there is a lack of long-term vision and preparation for the more ambitious decarbonisation targets for 2050. Bridging this gap in awareness is critical for ensuring full engagement in achieving the long-term sustainability objectives necessary for a successful transition to Net-Zero emissions.

Table 4
Assessment of tourism enterprises' provision in climate action literacy and measuring emissions from tourism operations



*%=exact percentages in the horizontal row, with the same percentages mapped in the columns on a timeline

Tourism enterprises generally understand key climate action terms like "climate change" and "carbon emissions". However, a significant gap exists in understanding more specific concepts such as "decarbonisation" and "Net-Zero destination". Interestingly, while many enterprises report limited understanding of the term "Net-Zero destinations", 65% are more familiar with it compared to "decarbonisation" (23%) and "climate neutral" (12%). This suggests that while there is some recognition of the broader goal of a Net-Zero destination, there may be confusion or lack of clarity regarding the technical processes needed to achieve it, particularly decarbonisation efforts. Clear communication and education on these distinct concepts are

required to help enterprises better align their actions with long-term sustainability goals (Fuchs, 2023). Some participants noted that the use of varying terms like sustainable tourism, Net-Zero, and decarbonisation confuses within the tourism industry, hindering alignment and effective communication of climate action efforts:

“See the list of words thrown at tourism businesses about what we should do. All while trying to keep our head above water in a short season with rising costs and a staff shortage.”

This underscores the importance of standardised language and clear guidelines to ensure consistent climate action and achieve sustainability goals.

Tourism enterprises recognise the significant role of carbon emissions in climate change and the potential impacts on the sector's future. Qualitative data highlighted three main concerns: *“higher travel costs”*, *“lack of destinations due to climate disasters and biodiversity loss”*, and a *“decrease in tourists due to demand for carbon-neutral destinations”*. As shown in Table 4, respondents emphasise the shared responsibility of both enterprises and tourists in reducing emissions, advocating for investments in sustainable practices like renewable energy, eco-friendly supply chains, and resource efficiency. They also call for promoting sustainable travel options, such as direct flights, public transportation, and virtual meetings, to reduce the industry's environmental impact.

The findings confirm that tourism enterprises possess sufficient climate action literacy and recognise the importance of integrating climate action into all tourism operations (OPSTP, 2020; Loehr & Becken, 2021; Gössling et al., 2023). However, there is a clear need for a unified message from policymakers and planners, aligning with the theories of Juvan and Dolnicar (2014) and Higham et al. (2022). Achieving net zero emissions by 2050 is a significant challenge for the tourism sector, and both enterprises and tourists must actively contribute to the decarbonisation process.

To assess destinations' commitment to climate action in tourism, various enterprises were evaluated on their participation in measuring tourism emissions to track annual decarbonisation progress. Initial findings revealed that most tourism enterprises are not actively measuring or reporting emissions from their operations (Table 4). Regarding upskilling for climate action, only half of the enterprises expressed interest in training to regularly measure, monitor, and report emissions, while 40% were uncertain. As one respondent noted,

“Learning this in-house rather than relying on consultants would be beneficial.”

These findings are concerning, as global tourism leaders have repeatedly stressed the importance of measuring tourism emissions. The results align with previous studies showing that enterprises are not actively measuring emissions from tourism operations (UNWTO, 2023). Furthermore, under European Union law, enterprises must report on environmental and social impacts, including climate change and pollution (EC, 2023). As a result, tourism enterprises may face penalties unless they begin reskilling and upskilling their workforce to accurately report environmental and social impacts, helping to avoid potential greenwashing.

Of the 14% of tourism enterprises actively measuring and reporting emissions, most rely on third-party consultants, as shown in Table 5. This finding aligns with previous studies (UNWTO, 2023). These enterprises measure emissions monthly, allowing them to track seasonal variations. However, they are hesitant to disclose emissions data, missing the opportunity to reduce costs by upskilling in-house employees to measure emissions independently (WTTC, 2021). Moreover, their reluctance to share emissions data limits transparency and prevents them from gaining a competitive edge by showcasing their decarbonisation efforts to visitors and investors.

Table 5**Assessment of enterprises that are measuring emissions from tourism operations**

How is your <i>enterprise</i> measuring emissions?	Carbon calculator	22%
	Environmental Management System	21%
	Third-party	50%
	Other	7%
How often does your <i>enterprise</i> measure emissions?	Monthly	79%
	Annually	21%

This study found that most enterprises measuring emissions from their operations tend to overlook transport-related emissions, focusing primarily on emissions from food and beverage services and accommodation consumption (Table 6).

Table 6**Assessment of emission sources that tourism enterprises are measuring**

What emission sources are included in your measurement?	<i>Components of Tourism Consumption</i>	
	Accommodation	43%
	Air travel	14%
	Food and beverage	71%
	Land travel	7%
	Water travel	7%
	<i>Scope 1. Direct emissions</i>	
	Electricity consumption	93%
	Water consumption	93%
	Waste generated	93%
	Mobile fuel combustion	21%
	Stationary fuel combustion	36%
	Refrigerant consumption	29%
	<i>Scope 2. Indirect emissions (third parties)</i>	
	Heat, cooling, or steam consumption	36%
	<i>Scope 3. Indirect value chain emissions</i>	
	Other purchased services	14%
	Business travel	14%
	Employee commuting	7%
	Material consumption	0%

Additionally, enterprises primarily focus on measuring direct emissions from electricity consumption, water usage, and waste generation. This aligns with findings from other studies, which highlight challenges in measuring indirect emissions due to data gaps and difficulties in allocating responsibility across the value chain (Sun, 2014; Sharp et al., 2016; Conefrey & Hanrahan, 2022a; UNWTO, 2023). Enterprises must measure all three emission scopes, as indirect emissions often exceed direct emissions (Dwyer et al., 2010). Therefore, reskilling and upskilling the tourism workforce is vital to address the complexities of measuring indirect and induced emissions (Scopes 2 and 3).

The research highlights significant gaps in the tourism sector's engagement with climate action and decarbonisation. While tourism enterprises are generally aware of the short-term emission reduction targets for 2030, there is limited understanding and preparedness for the more ambitious Net-Zero target for 2050. Furthermore, key concepts like "*decarbonisation*" and "*Net-Zero destination*" are poorly understood, leading to confusion about the specific actions required to achieve these long-term goals.

Another critical gap is the insufficient involvement of tourism enterprises in actively measuring and reporting emissions. Among the few enterprises that do measure emissions, most rely on third-party consultants rather than developing in-house capacity. Additionally, indirect and induced emissions are often neglected when

reporting emissions. These gaps highlight the urgent need for enhanced education, more transparent communication, and improved capacity within tourism enterprises to measure and report all emission types accurately.

To bridge these gaps, it is essential to translate climate action theory into practice effectively. This includes increasing participation in environmental impact reporting and improving the accuracy of emissions measurement across tourism operations. Such efforts will be crucial for meeting the European Union's mandatory sustainability reporting requirements and contributing to global Net-Zero targets.

5. Conclusion

For the tourism industry to effectively contribute to climate action and transition to Net-Zero emissions by 2050, several critical factors must be urgently addressed. One of the most pressing is the need for reskilling and upskilling the workforce to align with a decarbonised world, as tourism cannot be deemed sustainable without actively monitoring its decarbonisation progress (Conefrey & Hanrahan, 2022b; Scott, 2021a; 2021b; Conefrey et al., 2024). Evidence shows that tourism enterprises possess adequate climate action literacy and recognise their role in integrating sustainability into operations (Gössling & Scott, 2018; OPSTP, 2020; Loehr & Becken, 2021; Gössling et al., 2023). These enterprises also understand the importance of taking responsibility for their emissions by regularly measuring, monitoring, and reporting them, ensuring transparency and supporting the development of evidence-based decarbonisation practices.

This case study highlights a significant gap in climate action within tourism enterprises. If this issue is widespread, tourism businesses will face a considerable challenge in upskilling their workforce and aligning their operations with the United Nations Sustainable Development Goals, particularly with a renewed emphasis on climate action. Under EU law, all enterprises in member states must report on sustainability issues by 2028 (EC, 2023). Therefore, the workforce across all sectors of the tourism industry and other industries must be equipped with the necessary skills and training to measure, monitor, and report emissions. This will support sustainable management and development by implementing evidence-based policies and strategies.

Various studies have shown that climate action literacy and decarbonisation practices are critical for sustainable tourism (Septyandi & Prawira, 2022; Scott & Gössling, 2022). The authors of this paper urge tourism enterprises worldwide to reassess and, if necessary, realign their operations to ensure their workforce possesses the skills required to meet the demands of Net-Zero destinations. The findings of this study provide valuable data to assess the current level of commitment to climate action within the tourism industry.

5.1. Limitations and implications

The literature indicates that the tourism industry cannot achieve sustainable development without actively monitoring its environmental performance. Consequently, tourism enterprises play a crucial role in climate action by regularly measuring and reporting emissions to assess the level of decarbonisation achieved annually (OPSTP, 2020; Loehr & Becken, 2021; Scott, 2022a; 2022b; Gössling et al., 2023). However, it is essential to acknowledge the limitations and implications of this study.

Firstly, the study involved a limited number of tourism enterprises, as these businesses often lack sufficient human resources, restricting the number of participants. This limitation may impact the representativeness and generalizability of the findings to the broader industry. Additionally, the research was conducted in a specific destination, limiting the ability to extrapolate the results to global tourism enterprises. The researchers recommend replicating the study internationally to gain a more comprehensive understanding of climate action in tourism.

The study does not track changes over time, making assessing the long-term evolution of tourism enterprises' climate action literacy and decarbonisation efforts difficult. The researchers recommend longitudinal research to gain insights into how these efforts progress over time and to identify any shifts in understanding or practice.

Another limitation is the focus on emission measurement without considering external factors like industry demands, economic conditions, and regulatory changes, which may impact enterprises' willingness to adopt climate action measures. Balancing these factors is essential for achieving a sustainable, Net-Zero tourism industry and meeting emission reduction targets.

These limitations suggest that further research is needed to address these gaps and provide a more comprehensive and representative understanding of climate action within the tourism sector.

5.2. Future research

The researchers recommend replicating this study in different destinations to refine and develop a universal framework for measuring sustainable destination development. Expanding the survey across diverse contexts will provide a comprehensive understanding of how tourism enterprises engage with climate action while identifying region-specific barriers and enablers to decarbonisation. Longitudinal research is also suggested to track the progress of decarbonisation efforts, offering insights into the effectiveness of strategies, changes in practices, and shifts in understanding as enterprises work towards Net-Zero targets.

This study is part of a broader research initiative to conduct longitudinal analysis every five years to track progress towards the 51% emission reduction target by 2030 and the transition to Net-Zero emissions by 2050.

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Appendix 1

Link to the data collection instrument

<https://app.smartsheet.com/b/form/ae7fb00b665f48f9a66b95187bade508>