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# Environment and blue tourism: Moving towards sustainability—6th maritime tourism observatory for Skyros Island

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**Abstract:** Ports are some of the most significant entry points for Greek tourism investments and can be characterized as “development tools” for the country, both at the local and national level. The blue economy is a recent example of economic development, globally promoted as a way to achieve sustainability in maritime and coastal areas. Linaria Port has been accredited by the United Nations as “the blue port with a shade of green”, constituting an environmentally sustainable community capable of promoting responsible environmental behavior both within the local community and among tourists. The port has been highly competitive in achieving high sustainability standards and mainly operates in ways that complement environmental quality. It has presented innovative, competitive, and sustainable solutions since 2010. This research aimed to collect primary and secondary data on tourist preferences to evaluate these services. Evaluation was conducted through anonymous questionnaires divided into two parts: the first part concerned the tourist profile, and the second part concerned tourists’ opinions on the services and facilities of the port and the island. In the evaluation of the port, 91% of respondents rated the marina positively compared to other ports in the country, while 77% ranked the port of Skyros in a good position compared to other European or international ports. The overall quality of the tourist product was positively evaluated at 89%, while 90% of visitors were generally satisfied with the overall services offered. Moreover, 95% would return to Skyros within the next few years.

**Keywords:** blue tourism; Skyros project; blue economy; maritime services; port services; sustainable community; sustainable tourism

## 1. Introduction

Since the conclusion of World War II, the global tourism sector has experienced profound transformations influenced by economic, technological, and social advancements, as delineated by Katemliadis and Papatheodorou [1]. Among these shifts, maritime tourism has emerged as a pivotal economic domain, particularly for nations boasting accessible and picturesque coastlines, as expounded upon by Tonazzini et al. [2]. Factors such as cultural heritage, temperate climates, warm hospitality, and historical richness have contributed significantly to the growth of maritime tourism [3]. In Europe, the coastal regions amalgamate a vibrant maritime legacy with diverse landscapes and protected natural habitats. The marine environments exhibit unparalleled biological diversity and scenic splendor, rendering maritime tourism a cornerstone of the European tourism industry [4].

Island tourism plays a significant role in enhancing the economic and social wellbeing of countries. Yet, the adverse effects it has on the environment cannot be overlooked, as highlighted in studies by Fisher et al. [5], Mohd Shariff and Tahir [6],

and Teh and Cabanban [7]. Ocean literacy is defined as the mutual impact between the ocean and humans, and as per UNESCO, it is believed to enhance economic stability and national security. This understanding also helps society grasp essential issues related to a variety of ocean-related topics, including ecology, trade, energy exploration, climate change, biodiversity, ocean and human health, and fostering a sustainable future [8].

## **2. Materials and methods**

The methodology employed in this research endeavor was tailored to meet the specific needs of the Administrative Authority of the Port of Linaria, which sought to assess and enhance the tourist offerings and services within the port premises. Drawing upon insights gleaned from previous studies, including the 1st and 2nd Tourist Observatory of Skyros conducted in 2015 and 2018, as well as the 1st to 5th Marine Tourism Observatory spanning from 2016 to 2021, the 6th Maritime Tourism Observatory was conducted during the summer months of 2022 on the island of Skyros. The primary objective of this observatory was to assess the current state of the tourist products and services available at the Linaria tourist shelter, comparing it with data from previous years. Furthermore, the endeavor involved gathering data pertinent to the enhancement of services and goods both within and beyond the port premises, with the overarching goal of bolstering the overall tourist experience on the island.

### **2.1. Tourism observatory of Skyros**

Initiated in the summer of 2015, the Skyros Tourist Observatory aimed to gauge and analyze the sustainability of tourist activities and their impact within the study area, focusing on the island of Skyros. Subsequently, in 2018, this research endeavor was revisited to update the existing database [9].

### **2.2. Maritime tourism observatory**

The establishment of the Skyros Marine Observatory represented a groundbreaking initiative within Greek maritime research, inaugurated during the summer of 2016 and subsequently honored with the prestigious gold prize at the National Tourism Awards the following year [10]. Drawing inspiration from the Tourist Observatory of Skyros and leveraging insights from an extant study conducted by the University of the Aegean, Department of Shipping, which focused on cruise tourism in Chios [11], the foundation for this research endeavor was laid. Following necessary modifications and adjustments to align with the specific context, during the summer months of July and August 2016, a comprehensive survey was conducted, involving the distribution of questionnaires to vessels berthed at the Port of Linaria. Subsequent to its completion, the findings of this research were showcased in March 2017 at the International Environment Conference held in Dubai, Innovation Arabia 10 [10]. Since its inception in 2016, the Skyros Marine Observatory has continued to evolve, with six additional observatories conducted, including the latest iteration.

### **2.3. 6th maritime tourism observatory of Skyros Island**

The 6th Skyros Tourist Observatory, conducted in collaboration with the Skyros

Port Fund and the Special Academic Unit for Environmental Education, Training, and Communication, the Laboratory of Hygiene and Epidemiology, the Department of Public and Community Health, and the School of Public Health at the University of West Attica, took place during the summer months of 2022. A total of 100 responses were collected from different vessels, with each response representing a distinct vessel. The questionnaire, comprising 28 open and closed-ended questions across two sections, was meticulously designed following a comprehensive literature review and in consultation with Skyros Port Fund to ensure alignment with specific requirements.

The first section of the questionnaire focused on gathering demographic data, including age, gender, and ethnicity, drawing from the survey tool issued by the European Regional Agency. Additionally, inquiries were made concerning boat handling skills and maritime tourism habits to delineate visitor profiles. These questions were adapted from previous Marine Tourism Observatories conducted at Marina Linarias.

The second section aimed to assess visitors' perspectives on port facilities and the tourism product of Skyros Island, mirroring the format of previous Marine Tourism Observatories held at the Port of Linaria from 2017 to 2021.

Survey administration involved the distribution of questionnaires to pleasure boats upon their arrival at the port, with researchers collecting them before departure. Participants were assured of the confidentiality of their responses, emphasizing that the data would be utilized solely for research purposes. The overarching objective of the research is to juxtapose the findings of the Marine Observatories with the present circumstances at the tourist port, facilitating the evaluation of its amenities and services.

### **3. Maritime tourism and sustainability**

#### **3.1. Maritime in Greece**

Greece, renowned for its extensive coastline spanning 16,000 km and encompassing over 1350 islands, approximately 230 of which are inhabited [12], holds a prominent position as a maritime nation, as highlighted by the Hellenic German Chamber of Commerce and Industry [13]. Both commercial shipping and tourism serve as pivotal pillars supporting the national economy.

The tourism sector within Greece has undergone remarkable development, emerging as a significant driver of economic growth [1]. The genesis of marine tourism in Greece traces back to the 1960s [14], with tourist arrivals witnessing a substantial surge from approximately 33,000 in 1960 to 37 million in 2019, according to the World Bank [15]. By 2013, Greece had secured its position as the third most favored tourist destination in Europe, trailing behind Italy and Spain [16].

Maritime tourism in Greece predominantly manifests through activities such as cruising, yachting, and daily maritime excursions [14]. Yachting entails recreational use of yachts by tourists, providing accommodation and catering services, and offering the flexibility for travelers to select destinations based on their preferences [16]. Cruising, on the other hand, represents a distinct leisure pursuit, characterized by organized tours typically lasting 7–14 days, enabling travelers to explore multiple destinations within a single voyage [17]. Given the burgeoning popularity of cruises,

cruise ships are often likened to “floating hotels” or “floating resorts,” equipped with amenities such as bars, clubs, restaurants, pools, shops, and theaters [18,19]. Greek ports serve as primary embarkation points for numerous cruise itineraries, complemented by ports in neighboring countries like Italy, Turkey, Cyprus, or Egypt [14].

Additionally, “daily” boats offer short-duration cruises departing from mainland or island ports to coastal or island destinations, commonly organized by tour operators [14]. Distinguished from traditional sailing and cruises, dayboats specialize in short, daytime excursions utilizing small vessels, devoid of accommodations or facilities for overnight stays or long-distance journeys [20].

### **3.2. Blue tourism and sustainability**

Maritime tourism stands as one of the tourism industry’s most expansive and rapidly evolving sectors [21], wielding significant influence over economic advancement. However, activities such as cruising, sailing, and eco-tourism are acknowledged as pivotal endeavors fraught with environmental and social ramifications [2].

The impacts of tourism on coastal and marine regions primarily emanate from the establishment and operation of infrastructure like hotels, vacation properties, ports/marinas, and waste treatment facilities, alongside marine and coastal recreational pursuits [22]. Predominant environmental repercussions include the consumption of potable water and energy for tourism-related services, alteration of land use and coastlines, pollution, and biodiversity loss [2]. Conversely, the tourism sector confronts escalating exposure to the environmental consequences of climate change. Notably, shoreline erosion has manifested along the Mediterranean coast, particularly in its southernmost regions [23]. Moreover, water consumption and rising sea levels pose formidable challenges for the tourism industry in the face of climate change [3].

The imperative of tourism sustainability is gaining prominence due to its environmental benefits [24]. A holistic approach, integrating all three dimensions of sustainable development—society, environment, and economy—is deemed essential [24]. Adhering to economic and tourism paradigms oriented toward environmental preservation and resource conservation offers a viable solution to these challenges [25]. Sustainable tourism is characterized as tourism that respects local communities, cultural heritage, and the environment [26], primarily rooted in ecological performance and social responsibility [27].

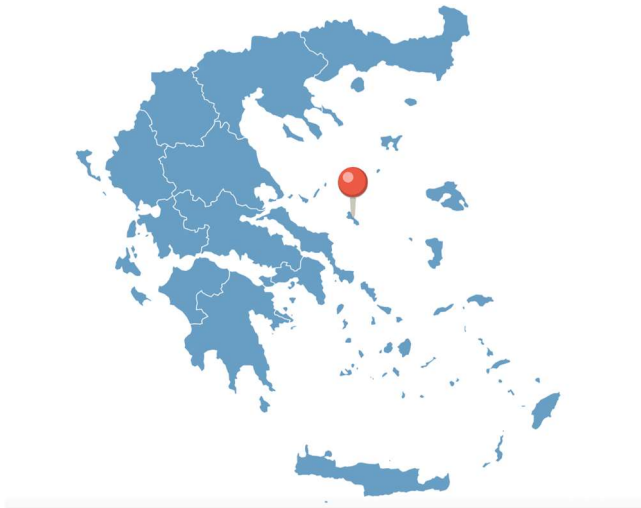
The emergence of the Blue Economy exemplifies a contemporary avenue for economic development, globally championed to foster sustainable progress in marine and coastal regions [26]. Encompassing economic activities reliant on the sea, often interconnected with sectors such as tourism, maritime transport, energy, and fishing [27], the Blue Economy embodies an economic framework grounded in ecosystem principles, ensuring not only economic growth but also ecological and social sustainability [25]. The United Nations delineates the Blue Economy as an oceanic realm striving to enhance human well-being and social equity while concurrently mitigating environmental risks and ecological imbalances [28]. Forecasts by the OECD suggest that by 2030, maritime tourism will constitute the largest segment of

the blue economy, surpassing 26% [29].

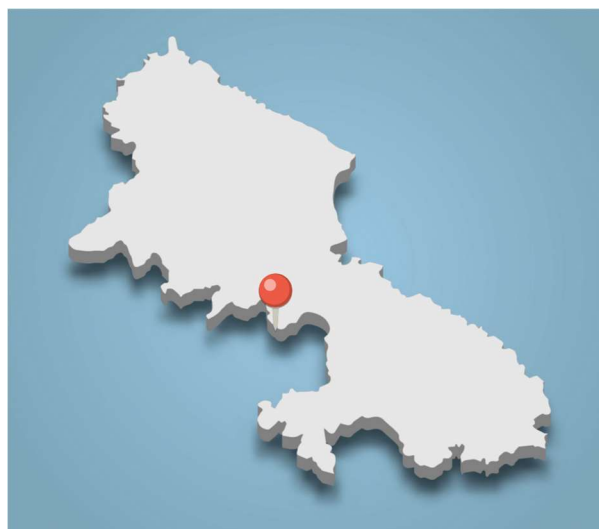
As marine tourism hinges upon robust marine ecosystems, its development necessitates integration into comprehensive and sustainable management frameworks, aiming to uphold fragile marine ecosystems, foster the blue economy, and ensure the sustainable utilization of marine resources [26].

### 3.3. Linaria port

Located at the heart of the Aegean Sea, the Skyros Island serves as a pivotal nexus connecting the North and South Aegean regions, as well as linking mainland Greece with neighboring Turkey [30]. The exact location of the island is presented in **Figure 1**. Linaria, situated on the island, hosts the eponymous port—a charming, amphitheatrically constructed town exuding picturesque modesty [31]. Linaria Port, a small Greek public port, garners recognition as a model establishment among “marinas” and “small ports” [32]. **Figure 2** illustrates the precise location of the port.



**Figure 1.** Location of Skyros Island in Greece.



**Figure 2.** Linaria port in Skyros Island, Greece.

In addition to its traditional services, Linaria Port has integrated an array of

environmentally friendly technologies, including:

- Informational posters detailing island environmental features, trail maps, and nautical charts.
- Equipment for marine pollution management (floating barriers, anti-fouling materials).
- A complimentary replacement library facility.
- Children's camps catering to ages 6–14 since 2015.
- A designated area for seminars and educational presentations.
- An atmospheric particle measurement station.
- Electric scooters facilitate silent staff mobility within the port.
- A specially designed area housing washing machines, dryers, and communication facilities with library access, computers, printers, and televisions.
- Collection and disposal services for recyclable materials and compactable waste.
- Provision of equipment for animal waste collection.
- Disposal facilities for cooking oils, motor oils, and led marine batteries.
- Flashing solar lanterns (beacons).
- Weather report provision.
- Real-time port position and weather condition monitoring via camera feeds [31].

Furthermore, Linaria Port proudly hosts Greece's inaugural mixed petrol station, catering to both vehicular and marine refueling needs [31]. Its multifaceted amenities position Linaria Port as a hub port, attracting significant tourist interest [30]. Accredited by the United Nations as a "Blue Port with the Shade of Green," Linaria Port epitomizes environmental sustainability, promoting responsible environmental practices to the local community and tourists alike [10]. Over the past decade, Linaria Port has garnered acclaim as Greece's most comprehensive and visitor-friendly public port, witnessing a remarkable 479% increase in arrivals [30].

The Skyros Port Fund demonstrates unwavering commitment to port enhancement, earning 26 national and international accolades, including a prestigious national award and two European first awards. Notably, Linaria Port clinched the Golden Tourism Award for the sixth time since 2015 following its recognition with the Blue Flag 2021. The "Skyros Project" initiative, in collaboration with the Port Fund and the University of the Aegean, continues its impactful endeavors since 2019 in partnership with the University of Western Attica. Notable actions encompass the Summer Academy of Environmental Educators, student internships, port environmental stewardship, and environmental education for children aged 6–14.

## **4. Results and discussion**

This section may be divided by subheadings. It should provide a concise and precise description of the experimental results, their interpretation, as well as the experimental conclusions that can be drawn.

### **4.1. Tourists' profile**

The initial segment of the questionnaire was devised to procure demographic information essential for delineating the prototypical profile of tourists frequenting the port of Linaria for recreational endeavors. Key inquiries encompassed the examination

of variables such as gender, age distribution, nationality, and financial status among respondents. A summary of these findings is succinctly illustrated in **Table 1**.

**Table 1.** Tourists' profile.

<b>Gender</b>	Male: 71% Female: 19%
<b>Nationality</b>	Greek: 44% Other: 56%
<b>Age group</b>	18–25: 9% 26–35: 14% 36–45: 14% 46–55: 28% 56–65: 21% 66+: 14%
<b>Education Level</b>	Primary: 0% Secondary: 16% Tertiary: 84%
<b>Annual individual income</b>	€0–€10,000: 12% €10,001–€20,000: 8% €20,001–€40,000: 21% €40,001–€60,000: 16% €60,001–€80,000: 10% €80,001–€100,000: 11% €100,001–€120,000: 5% €120,001–€150,000: 5% > €150,000: 12%

#### 4.2. Importance of port services

In the next section, tourists were asked to rate the importance of port services. Based on the results, it is observed that water supply is the most important port service, followed by mooring assistance, electricity, fueling, and toilets. The results are listed in more detail in **Table 2**.

**Table 2.** Importance of port services.

Port service	Not at all important	Low importance	Neutral	Important	Very important
Tethering assistance	2%	8%	19%	26%	45%
Water supply	1%	5%	12%	12%	70%
Electrification	3%	7%	12%	22%	56%
Wi-Fi	13%	19%	20%	16%	32%
Washer-dryers	14%	20%	23%	15%	28%
Space for hand washing	23%	20%	21%	17%	19%
Toilets	9%	5%	30%	17%	39%
Showers	5%	7%	17%	27%	44%
Refueling	5%	6%	17%	27%	45%
Cinema	66%	17%	12%	5%	-
Yoga classes	74%	14%	8%	2%	2%
Creative activities for children	52%	15%	18%	7%	8%
Secretarial support	37%	13%	22%	12%	16%
Banking services	6%	8%	28%	23%	35%

### 4.3. Importance of port security services

In the next section, tourists were asked to rate the importance of port security services. Based on the results, it is observed that weather coverage is the most important port security service, followed by storage, boat berth, personnel support, and permanent moorings. The results are listed in more detail in **Table 3**.

**Table 3.** Importance of port security services.

Port security service	Not at all important	Low importance	Neutral	Important	Very important
Permanent moorings	3%	6%	20%	23%	48%
Boat berth	2%	9%	7%	26%	56%
Personnel support	-	9%	15%	24%	52%
Weather coverage	-	4%	8%	19%	69%
Storage	4%	6%	11%	19%	60%

### 4.4. Importance of other provided services

This section proceeds with an evaluation of the significance of berthing costs, with 61% of respondents rating it as important. Furthermore, the prompt and efficient service provided by port and customs authorities is deemed significant by 58% of respondents. Similarly, the presence of restaurants garners high importance, with 62% of respondents acknowledging its significance. Conversely, complementary tourism services are deemed less critical, with only 23% of respondents attributing importance to them. **Table 4** provides detailed information about the significance of various additional services offered.

**Table 4.** Assessment of the importance of other provided services.

Service	Not at all important	Low importance	Neutral	Important	Very important
Affordable docking cost	11%	9%	19%	26%	35%
Correct and fast service from port and customs authorities	14%	12%	116%	26%	32%
Vessel technical support services	9%	21%	17%	27%	26%
Connection of the port with the main body of the country	14%	11%	24%	25%	26%
Overnight services	17%	8%	20%	26%	29%
Food services	9%	20%	9%	33%	29%
Transport services for the wider area/rest of the island	14%	20%	17%	18%	31%
Information services	11%	11%	34%	19%	25%
How interested are you in complementary tourism services in the areas you visit?	6%	17%	25%	26%	26%

The open-ended question concerning additional services sought at the port predominantly highlighted the necessity for a pharmacy and a marine supply store, garnering the highest number of mentions. Several respondents emphasized the importance of augmenting berth availability and enhancing transportation frequency to enhance the overall tourist experience. Moreover, some respondents commended



the port of Skyros for offering superior amenities compared to similar marinas, characterizing it as the premier port they have encountered.

#### 4.5. Visitor's stay in Skyros Island

The primary objective of the second section was to assess visitors' experiences during their stay in Skyros. Among the respondents, 56% indicated that their visit to the island of Skyros was their first, while 46% reported having visited the island previously. During their sojourn, the majority of tourists berthed their vessels at the port of Linaria, with some opting to visit the Bay of Agios Fokas. On average, visitors stayed at the marina for a duration of 4 days, with 96% choosing to spend the night aboard their boats. Evaluation of Linaria revealed that 91% of respondents regarded the marina positively compared to other ports in the country, while 77% ranked the port of Skyros favorably in comparison to other European or international ports. Additionally, the facilities and services provided by the port were subject to assessment, as detailed below (**Table 5**).

**Table 5.** Evaluation of other port and island services.

Service	Very poor	Poor	Satisfactory	High	Very high
Quality of port services	-	3%	10%	21%	66%
Port services quality/price ratio	-	5%	10%	42%	43%
Quality of services from third parties in the port area	1%	7%	22%	32%	38%
Quality/price ratio of port services from third parties in the Limena area	-	7%	27%	36%	30%
Evaluation of services in the rest of the island	3%	7%	23%	32%	35%
Sights	2%	26%	20%	39%	33%
Access to attractions	3%	8%	34%	32%	23%
Beaches	3%	9%	21%	35%	32%
Food	-	9%	10%	48%	33%
Road network	2%	12%	34%	32%	20%
Internal transport	8%	22%	27%	26%	17%
Resident-business behavior	2%	5%	15%	27%	51%

Respondents expressed concerns regarding the island's road network and public transport, advocating for increased frequency of services. Some highlighted potential improvements such as minimizing noise disturbances in the marina, particularly during morning departures of fishermen and arrivals of liners, as well as evening disruptions caused by garbage trucks. Conversely, participants commended the courteousness and helpfulness of port staff, along with the quality of services provided. Most respondents were impressed by the island's natural environment, waters, and beaches, while praising the cleanliness, organization, and overall efficiency of the marina environment.

The sought-after services and products by visitors included marine goods, medicines, and traditional products/sweets. Many suggested the presence of a boat mechanic in the vicinity of the port and the establishment of a supermarket chain to

enhance market variety.

Conclusion: In the assessment module, the overall quality of the tourism product received a positive evaluation from 89% of respondents, with 90% expressing general satisfaction with the services offered. Encouragingly, 95% expressed willingness to return to Skyros, whether by boat or other means.

## 5. Discussion

The analysis of the 6th maritime tourism observatory reveals a profile of the typical tourist opting to visit the port of Linaria during the summer season of 2022. Predominantly, this tourist is male, hailing from a foreign nationality, and falls within the age bracket of 46–55 years. Possessing a higher education degree, this individual boasts an annual income ranging between €40,000–€60,000. Furthermore, he holds an open sea skipper's license and owns a sailboat without a skipper (bareboat). Opting for an extended voyage exceeding 7 days, he intends to make stops at 4 or more ports in addition to the port of departure throughout his vacation.

In terms of preferences, this tourist prioritizes essential amenities such as water, electricity, fueling, and mooring assistance when selecting a port. Conversely, services such as banking facilities, secretarial support, laundry amenities, and restroom facilities hold lesser importance. Additionally, recreational offerings such as cinema access, yoga classes, and children's creative activities are of minimal interest to him.

Tourism can have both positive and negative effects on port activities. On one hand, it can bring economic benefits by increasing local spending and job creation in the maritime and hospitality sectors. This, in turn, can lead to better port facilities and services. However, the adverse effects can be significant. Increased tourism can cause congestion, environmental harm, and resource depletion, which can be challenging for port authorities to manage efficiently, especially regarding waste and energy use.

Moreover, social and cultural impacts on local communities can significantly alter lifestyles and social structures, which can also be a concern. Therefore, it is essential to balance these factors to ensure the sustainable development of port areas while prioritizing the well-being of residents. The impact of such tourists on port activities includes both gains and challenges. Economically, they boost local spending and job creation in the maritime and hospitality sectors, which can lead to better port facilities and services. However, the adverse effects are significant, too. Increased tourism can cause congestion, environmental harm, and resource depletion, challenging port authorities to efficiently manage waste and energy use. Furthermore, social and cultural impacts on local communities can significantly alter lifestyles and social structures. Achieving a balance between these factors is essential for the sustainable development of port areas and the well-being of residents.

## 6. Conclusion

Tourism stands as a fundamental pillar of the Greek economy and its overall economic development [1]. Particularly for numerous island and coastal regions, marine tourism represents the primary—sometimes sole—form of tourism. Ports serve as crucial gateways for tourism investments in Greece [30]. Despite their significant economic contributions, these activities often exhibit adverse environmental impacts

[9].

Tourism plays a vital role in the economies of many islands in the Mediterranean, similar to Greece, where sustainable development is becoming increasingly important. In Cyprus, for example, the Cyprus Sustainable Tourism Initiative promotes environmentally friendly practices in the tourism sector by emphasising eco-certification for hotels and sustainable transport [33]. Similarly, Malta conserves marine biodiversity and historical sites, with its tourism authority implementing a rigorous eco-certification program [34]. These initiatives throughout the Mediterranean region highlight strategies like economic incentives through eco-certifications, community involvement to align tourism with local needs, and strict environmental management, offering valuable lessons for Greece in balancing economic benefits with environmental preservation in its tourism sector.

The imperative of tourism sustainability is increasingly recognized due to its environmental advantages [24]. Consequently, there is a growing consensus on adopting a holistic approach, considering all three dimensions of sustainable development—society, environment, and economy [24].

### **Limitation**

While a 100-questionnaire study provides valuable insights, its limitations include potential respondent fatigue, limited depth of exploration, and susceptibility to response bias. Further investigation is needed to employ diverse methodologies, such as interviews or observational studies, to deepen understanding and validate findings across varied contexts.

**Author contributions:** Conceptualization, CS, KA and GTZ; methodology, KA; software, GTZ; validation, GTZ, CS and KA; formal analysis, GTZ; investigation, GTZ; resources, KA; data curation, GTZ; writing—original draft preparation, GTZ; writing—review and editing, IT; visualization, GTZ; supervision, CS; project administration, CS. All authors have read and agreed to the published version of the manuscript.

**Consent to participate:** The participation was volunteering.

**Availability of data and material:** All the data and material used for the purpose of this work are provided in the paper.

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