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Sustainability Practices in Sports Facilities and Managers' Perceptions

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ABSTRACT

Study Aim(s): This paper investigates key sustainability strategies, management perspectives, enabling conditions, and obstacles related to the implementation of sustainability practices in sports facilities.
Methods: The study employed a qualitative research methodology using semi-structured interviews with administrators of 15 sports facilities in Istanbul, each varying in size and usage. Focusing on sustainability practices, the interviews explored administrators' understanding of sustainability, priority implementation areas, and motivations behind adopting such measures.
Results: Results indicate that managers define sustainability in a relatively narrow sense, focusing primarily on energy efficiency, water usage, waste management, and the preservation of green spaces. Facility managers are actively pursuing initiatives such as energy-efficient systems, water recycling, waste reduction programs, and the use of environmentally friendly products. Sports venues in Istanbul are promoting sustainability through planning, resource allocation, and educational efforts. However, gaming activities and infrastructure remain key challenges. Policymakers should consider providing targeted financial support such as grants or subsidies in order to improve infrastructure and further sustainability efforts.
Conclusion: To strengthen sustainability practices in sports facilities, it is recommended that policymakers develop targeted financial support programs such as grants or subsidies, especially for infrastructure improvements. Additionally, mandatory sustainability training modules should be implemented for facility managers, and regular public awareness campaigns should be institutionalized. Encouraging cooperation and benchmarking among facilities through national sustainability standards can promote the dissemination of best practices and enhance overall performance.

Keywords: Sustainability, Sports Facilities, Sports Management

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INTRODUCTION

In today's world, sustainability has become a critical concept, driven by the urgent need to protect natural resources and ensure a habitable planet for future generations. The development and implementation of sustainable objectives are primarily prompted by environmental concerns such as pollutant emissions, biodiversity loss, resource depletion, and global climate change [1, 2]. In this context, sports facilities represent essential social and physical infrastructures that must be evaluated through the lens of environmental sustainability. Greening these facilities can contribute in resource conservation while also raising public awareness and fostering support for social responsibility [3]. Although sustainability is gaining increasing importance, many sports facilities continue to face major challenges in implementing sustainable practices. Key obstacles include high initial investment costs, inadequate infrastructure, limited managerial dedication, and a lack of comprehensive understanding of sustainability concepts [4, 5]. Additionally, the absence of standardized criteria for evaluating sustainable practices hinders the consistent adoption of environmentally friendly policies [6]. These challenges highlight the need to combine effective policy measures with innovative management implications to drive progress toward sustainability [7, 8].

Managerial awareness and perspective are key determinants in the adaption of sustainable practices across sports facilities. Trendafilova and McCullough (2018) demonstrated that the willingness and readiness of facility managers to implement sustainable practices directly determines the extent to which these practices are included into facility operations. Their study shows that managers who are aware about and optimistic towards sustainability significantly increase the possibility of including sustainable measures into daily activities [9]. Therefore, it is imperative to define the attitude and perspective of facility managers to effectively implement sustainable sports management. Beyond managerial involvement, promoting sustainability involvement requires for collaboration among various stakeholders, including local governments, sports leagues, and the general public.

Beyond managerial participation, promoting sustainability requires cooperation among stakeholders including local governments, sports leagues, and the general public. Establishing effective partnerships enhances the growth of innovative practices, resource sharing, and knowledge exchange. This is exemplified by engaging local communities in sustainability initiatives, which not only supports their well-being but also raises awareness of sustainability principles [10]. Furthermore, the environmental performance of sports facilities can be significantly improved through the adaptation of modern technologies, such as energy-efficient systems and waste management solutions [5].

Sports facilities play a vital role in promoting public health and physical activity, as well as demonstrating social responsibility through sustainable operations [8]. Moreover, the study highlights the growing awareness of sports' potential to foster environmental responsibility, thereby supporting the SDGs [10]. Integrating sustainability practices with the 2030 Agenda and SDGs provides sports with an opportunity to respond to the global environmental sustainability agenda and position sports facilities as leaders in environmental stewardship [9].

Despite the significant importance of sustainability practices, many sports facilities have yet to adopt them effectively. This limited adoption is primarily attributed to the perceptions and awareness levels of facility managers, which remain a central challenge discussed in this study. Organizational barriers and unexpected staff disengagement further hinder the successful implementation of sustainability

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initiatives, even though there is broad consensus on the importance of sustainability [4,5,7]. Therefore, to develop effective strategies that support environmental sustainability, it is crucial to holistically examine facility managers' perceptions, as well as the perceived barriers and facilitators to implementing sustainable practices [11].

The purpose of this study is to examine the perceptions, sustainability practices, and implementation challenges faced by sports facility managers in Istanbul. Using a qualitative approach based on semi-structured interviews, the study aims to identify the main factors influencing sustainable operations and planning. The findings should provide guidance and support policymakers in evaluating and developing environmental policies for sports facilities.

METHODS

Ethical Considerations

This study was conducted in accordance with the ethical standards of the Declaration of Helsinki. All participants were fully informed about the study's purpose and procedures and provided their voluntary informed consent prior to participation. As the study did not involve medical interventions or vulnerable populations, ethics committee approval was not required under institutional regulations.

Study design

This research employs a qualitative approach, utilizing content analysis based on semi-structured interviews to examine energy efficiency initiatives in sports facilities from the perspective of facility managers. Content analysis is a systematic method that investigates individuals' beliefs, thoughts, feelings, and experiences, offering rich and detailed insights by capturing current developments [12]. Within the scope of this study, semi-structured interviews were conducted with 15 sports facility managers to collect in-depth data on sustainability practices, challenges encountered, and elements facilitating the process.

Methods

Study model

Content analysis was implemented as the qualitative research methodology in this study. It is a systematic approach to examining data content to identify themes, trends, and implications. According to [12], content analysis is a research method used to generate reliable and meaningful findings from data. Researchers frequently apply it to analyze documents, texts, and other forms of media. This process is further facilitated by coding, which involves dividing written text into meaningful units such as themes, concepts, or categories. The objective is to identify patterns and concepts within the data to provide deeper insights into the phenomenon under investigation. Instruments for Data Acquisition: The study employed the convenience sampling technique, a purposive sampling strategy commonly used in qualitative research, Briefly, convenience sampling involves selecting participants who are readily accessible to the researchers allowing for quick and cost-effective data collection while saving time and effort [13]. Data were collected using a personal information form and a semi-structured interview guide. The personal information form gathered demographic data such as sex, age, and education. The semi-structured interviews were used to explore participants' experiences and perspectives in depth. This qualitative interview method was chosen as an effective way to capture participants' knowledge, attitudes, feelings, and experiences through open-ended questions [12,14].

Data were obtained through semi-structured interviews with 15 sports facility managers in Istanbul. Participants were deliberately selected based on their roles and expertise in managing various sports

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facilities. Prior to the interviews, the purpose of the study was clearly explained to all participants.

The interview questions were carefully developed to directly address the research objectives. They examined participants' understanding of sustainability, existing sustainable practices, perceptions of how these practices have evolved, factors facilitating or hindering sustainability, and the managerial skills deemed necessary for effective sustainability management.

The interviews lasted approximately 30 to 45 minutes, allowing ample time for participants to share their experiences and perspectives in depth. Through this process, qualitative data were collected on the participants' views related to the study. The research was conducted with a rigorous design and data collection procedures to ensure the study objective were effectively met.

Data analysis

The recorded interviews were transcribed verbatim. Based on anticipated participant responses, themes and codes were developed by examining common characteristics. The transcriptions were examined using inductive content analysis, which aims to refine the extracted concepts and relationships to systematically interpret the collected data [13]. Meaningful units were manually identified and coded, with similar codes grouped to form broader categories. Recurring patterns across responses emerged as main themes through an iterative refinement process. This method is suitable for gathering detailed qualitative information on the experiences of the 15 participants. Additionally, the collected data can be analyzed to gain deeper insights and understanding of the phenomenon, which supports the development of informed recommendations. Thus, the research design and data collection processes are robust and conducive to achieving the study's objectives.

Validity and reliability

For this analysis, the audio recordings of the interviews were transcribed verbatim and analyzed using content analysis. The main goal of content analysis is to uncover concepts and relationships that explain the collected data [13]. Themes were constructed based on anticipated participant responses and categorized by comparing common characteristics. This approach is appropriate as it gives rich and nuanced qualitative data about the experiences of the educators involved in the study. Furthermore, analyzing the collected data enables the extraction of meaningful insights about the event and supports the development of informed recommendations. Credibility was ensured by systematically transcribing participant statements and applying consistent coding procedures across all data. Dependability was ensured by maintaining a standardized interview protocol and uniform data collection methods for all participants. Confirmability was supported through detailed documentation of coding decisions and the theme development process. Transferability was strengthened by providing detailed descriptive information about participants' demographic characteristics and the contexts of their facility. Accordingly, the research design and data collection procedures were deemed rigorous and appropriate for achieving the objectives of the study.

RESULTS

Analysis of the demographic characteristics of the 15 managers participating in the study revealed an average age of approximately 43.13 years, ranging from of 34 to 55 years. The sample included seven women (47%) and eight men (53%). Participants' length of service varied from a minimum of four years to a maximum of twenty years, with an average tenure of nearly ten years.

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All the managers work at sports facilities located in Istanbul. These facilities vary in scale, including seven large-scale, six medium-scale, and two small-scale establishments. The participants manage a diverse range of sports venues, such as swimming pools, fitness and health centers, stadiums, multi-use sports halls, tennis courts, football pitches, athletics tracks, and sports complexes.

Table 1 shows the results of the analysis of participants' interpretations of sustainability in sports facilities.

When asked, "How do you define sustainability in your facility?" four main themes emerged. The table below presents these concepts.

Table 1. Facility Managers' Definition of Sustainability in Sports Facilities

Themes	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	F
Energy efficiency and the use of renewable energy	✓		✓	✓			✓			✓				✓	✓	7
Water conservation and the protection of natural resources		✓			✓			✓		✓		✓	✓			6
Recycling processes and the reduction of plastic waste			✓			✓	✓				✓				✓	5
Preservation of green spaces									✓				✓		✓	3
Use of eco-friendly cleaning products								✓			✓					2

Y1-15: Participants codes; F: The frequency of responses; ✓: Participants who answered "Yes" to the corresponding item

The respondents primarily describe sustainability in terms of reducing energy and water consumption. For example, Participant Y1 stated, "Our facility operates in an environmentally sustainable way, through water conservation, energy efficiency, and recycling programs." Participant Y4 likewise emphasized "energy-efficient lighting and water-conserving systems." Several interviewees identified waste management as a key component of sustainability in sports facilities. Participant Y3 emphasized "the use of renewable energy sources and the management of waste." Additionally, nature preservation and sustainable landscaping were notes as essential steps toward achieving sustainability. So, Participant Y9 emphasized the importance of "preserving natural grasslands". In addition, some participants mentioned the use of environmentally friendly materials in their sustainability efforts. As Y11 noted, it is important to "use materials that are environmentally benign." Based on responses to the question, "In what areas do you implement sustainability efforts in your facility?" we identified six key themes. These are illustrated in the following table.

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Table 2. Areas of Sustainability Practices in Sports Facilities

Themes	Y 1	Y 2	Y 3	Y 4	Y 5	Y 6	Y 7	Y 8	Y 9	Y 10	Y 11	Y 12	Y 13	Y 14	Y 15	F
Energy efficiency and the use of renewable energy	✓		✓	✓			✓		✓	✓		✓		✓	✓	9
Water conservation and the protection of natural resources	✓	✓			✓			✓		✓		✓	✓			7
Waste management and recycling processes			✓			✓	✓		✓		✓		✓			6
Eco-friendly practices and products				✓					✓				✓		✓	4
Technological transformation and infrastructure improvement											✓					1
Education and staff awareness								✓								1

Y1-15: Participants codes; F: The frequency of responses, ✓: Participants who answered "Yes" to the corresponding item

The participants emphasized the importance of energy efficiency measures in their emergency facilities. Participant Y2 highlighted their focus on energy management policies, stating, “We changed our lighting to LED systems and use low-energy-consuming devices.” Additionally, many facilities prioritize water conservation and reuse as key sustainability efforts. For example, Participant Y1 reported, “We upgraded our pool water filtration system to enhance water conservation.” Participants highlighted waste management in their facilities. Participant Y11 identified waste management as a key policy, while Participant Y5 noted the significance of using green chemistry and eco-friendly products. A few participants were aligned with this idea. For example, Participant Y5 commented, “Our goal was to reduce chemical usage and switch to environmentally friendly products. Many facility administrators also consider technological investments to be an integral part of sustainability practices. Participant Y3 stated, “We installed solar panels on our roof,” illustrating the impact of the technological innovation. Additionally, interviewees emphasized the need for training and awareness-raising initiatives. Participant Y10 explained, “We have training sessions to promote awareness of reducing plastic usage among athletes and staff.” Analysis of responses to the question, “What is the importance of implementing sustainability practices in sports facilities?” revealed three themes. These are presented in the following table.

Table 3. The Perceived Significance of Implementing Sustainable Practices

Themes	Y 1	Y 2	Y 3	Y 4	Y 5	Y 6	Y 7	Y 8	Y 9	Y 10	Y 11	Y 12	Y 13	Y 14	Y 15	F
Environmental responsibility and investment in future generations	✓	✓		✓		✓			✓		✓		✓		✓	8
Reducing environmental impacts			✓				✓			✓			✓	✓		5
Healthy and safe sports environment					✓			✓				✓				3

Y1-15: Participants codes; F: The frequency of responses, ✓: Participants who answered "Yes" to the corresponding item

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Participants highlighted the critical importance of sustainability practices in protecting the environment and ensuring the sustainable use of natural resources. For example, Participant Y12 mentioned, "In sports facilities, we should have environmentally friendly practices so that future generations inherit a more habitable world."

Economic sustainability was also identified as a key criterion. Participant Y1 remarked, "Using fewer natural resources is fundamental, as this benefits the environment and reduces operational costs." Participants emphasized the importance of sustainability practices in mitigating environmental degradation within sporting venues. For example, Participant Y4 mentioned the importance of sustainability in sports, noting that sustainability practices are critical in reducing environmental pollution and nature and protecting natural areas within sports facilities. Sustainability was also highlighted by facility managers as a crucial factor related to athlete health and safety. Participant Y10 emphasized its importance for facility performance, stating, "Sustainability in sports facilities is important because it protects the environment while providing a healthy space for athletes." Analyzing the responses to the question, "As management, what are your goals related to your sustainability practices?" four key themes emerged. The table below details these themes.

Table 4. Sustainability Goals in Sports Facilities

Themes	Y 1	Y 2	Y 3	Y 4	Y 5	Y 6	Y 7	Y 8	Y 9	Y 10	Y 11	Y 12	Y 13	Y 14	Y 15	F
Water conservation	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓		✓	✓	12
Saving energy		✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓	11
Reducing plastic consumption		✓	✓		✓		✓	✓			✓		✓	✓		8
Eco-friendly practices	✓		✓			✓		✓			✓	✓	✓			7

Y1-15: Participants codes; F: The frequency of responses, ✓: Participants who answered "Yes" to the corresponding item

Many participants had already set goals related to water management and conservation at their facilities. For example, participant Y9 stated, "We want to improve the sustainable irrigation system of our football field and install rainwater harvesting systems." Additionally, many managers focused on the importance of using renewable energy sources and reducing overall energy consumption. As an organization whose motto is "Engaging the energy of a community to be clean and renewable", participant Y3 shared that their intention was to install solar panels and meet the facility's energy needs through renewable sources. Likewise, participant Y7 pointed out, "We aim to switch all lighting to energy-saving LED systems." Moreover, respondents reported that they have set specific targets to improve waste management and reduce plastic usage within their facilities. For instance, participant Y4 emphasized the goal of "banning single-use plastics entirely." These facilities prioritize eco-friendliness, placing significant emphasis on initiatives aiming at protecting natural ecosystems. For example, Participant Y13 stated, "Our goal is to encourage the conservation of whatever natural life exists on our sports fields." Similarly, Participant 5 remarked on their intention to create an environmentally friendly facility by stating, "We have substituted most of the chemicals in our gym with eco-friendly products." In response to the question, "What factors help you improve sustainability practices in your facility?" four key themes emerged. The table below presents these themes in detail.

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Table 5. Factors that Help Develop Sustainability Practices in Sports Facilities

Themes	Y 1	Y 2	Y 3	Y 4	Y 5	Y 6	Y 7	Y 8	Y 9	Y 10	Y 11	Y 12	Y 13	Y 14	Y 15	F
Support and incentives	✓	✓		✓		✓		✓			✓		✓	✓		8
Management awareness			✓		✓	✓		✓		✓		✓	✓			7
Access to eco-friendly products and technology				✓			✓		✓						✓	4
Good examples and knowledge sharing			✓				✓			✓						3

Y1-15: Participants codes; F: The frequency of responses, ✓: Participants who answered "Yes" to the corresponding item

Many participants highlighted the critical role of financial grants, government incentives, and local government support in advancing sustainability initiatives for instance, Participant Y1 noted, "Government incentives and/or our access to eco-technologies are increasing." Moreover, respondents consistently highlighted that a high level of awareness and commitment among management teams significantly enhances the effective implementation of sustainability initiatives within sports facilities. Participant Y11 emphasized the importance of managerial awareness, stating, "Our employee training on this issue and the sustainability policies adopted by management enable us to further develop." Facility managers also noted that the implementation of sustainability practices is strongly influenced by the availability of eco-friendly products and the level of technology advancement. As Y5 stated, "Technological advancements have enhanced our collection of energy-saving sports equipment". Y6 noted that significant advantages to international sustainability standards and sharing information across facilities, noting, "We have implemented international standards." Participants' responses to the question, "Which factors limit or complicate the implementation of sustainability?" were qualitatively analyzed, revealing four main themes."

Tablo 6. Obstacles to Adoption of Sustainable Practices in Sports Facilities

Themes	Y 1	Y 2	Y 3	Y 4	Y 5	Y 6	Y 7	Y 8	Y 9	Y 10	Y 11	Y 12	Y 13	Y 14	Y 15	F
Financial Constraints and High Costs	✓		✓		✓		✓		✓		✓	✓		✓	✓	9
Lack of Information and Awareness	✓	✓		✓		✓			✓	✓			✓			7
Infrastructural Challenges and Inadequacies	✓						✓			✓			✓		✓	5
Lack of Institutional and Local Government Support				✓				✓				✓				3

Y1-15: Participants codes; F: The frequency of responses, ✓: Participants who answered "Yes" to the corresponding item

Many participants identified cost as the primary barrier to implementing sustainability practices. Participant Y3 emphasized this challenge, stating, "The transition to renewable energy systems for large facilities remains an expensive solution, and we are struggling to secure support for it. According to some participants, the greatest barrier to adopting sustainability practices is lack of proper knowledge

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and awareness among employees and customers. Participant Y2 highlighted this challenge, stating, "We face difficulties even when trying to reduce plastic use because some of our members are not sufficiently aware of sustainability." Participants Y8 and Y10 also acknowledged that the lack of environmental awareness among facility personnel is a significant barrier to change. Additionally, participants indicated that inadequate infrastructure is another significant factor hindering the development of sustainability practices. Participant Y7 explained "the old infrastructure of our facilities limits the shift toward energy-efficient systems." Interviewees also identified limited support from local and institutional governments as a critical barrier to implementing sustainable practices. To illustrate, Y4 highlighted the importance of such support, stating," If you do not get support from the local governments, you can never advance waste management." The analysis of responses to the question, "What methods do you use to raise your staff's awareness of sustainability practices?" identified four main themes mentioned in table 7.

Table 7. Methods for Increasing Employee Knowledge of Sustainability

Themes	Y 1	Y 2	Y 3	Y 4	Y 5	Y 6	Y 7	Y 8	Y 9	Y 10	Y 11	Y 12	Y 13	Y 14	Y 15	F
Education and information activities		✓			✓			✓			✓		✓	✓	✓	7
Integration into operational processes	✓		✓			✓			✓	✓						5
Use of visual and written reminders		✓		✓			✓					✓				4
Example from managers and daily incentives							✓		✓				✓			3

Y1-15: Participants codes F: The frequency of responses, ✓: Participants who answered "Yes" to the corresponding item

Participant Y10 noted the importance of these training activities, stating, "We have regular trainings on recycling, water use, energy use, etc." A less commonly used method to raise staff awareness is the incorporation sustainability practices directly into daily operational processes. As an example, participant Y8 stated, "We try to integrate sustainability into our operational process so that when employees undertake tasks, we encourage them to adopt sustainable practices." Some participants also reported promoting sustainable behaviors among their employees through visual and written directives. As participant Y3 noted, "We use information posters at work areas." Some participants highlighted the importance of managers setting a positive example by encouraging sustainable behaviors and offering daily initiatives. The importance of managerial role modeling was highlighted by participant Y1, who stated, "We promote sustainable behaviors and act as a role model of our staff." In response to the question, "How would you rate the impact of these practices on your facility's performance and reputation?" we identified three key themes through analysis which can be seen in table 8.

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Table 8. Perceived Impact of Sustainable Practices on Facility Performance and Reputation

Themes	Y 1	Y 2	Y 3	Y 4	Y 5	Y 6	Y 7	Y 8	Y 9	Y 10	Y 11	Y 12	Y 13	Y 14	Y 15	F
Enhanced Financial and Operational Performance		✓		✓			✓		✓			✓		✓	✓	7
Improved Image, Reputation and Brand Value	✓		✓		✓	✓					✓		✓			6
Great Stakeholder Satisfaction and Loyalty				✓				✓		✓			✓			4

Y1-15: Participants codes F: The frequency of responses, ✓: Participants who answered "Yes" to the corresponding item

According to the participants in our study, the implementation of sustainability practices resulted to a reduction in facility operating costs and an increase in operational efficacy. The impact on facility performance was explicitly emphasized by participant Y7, who stated, “We were able to reduce costs at the facility level by focusing on energy consumption.” The adoption of sustainable practices positively affected the brand image, prestige, and overall reputation of the facilities, as indicated by many respondents. For example, Participant Y2 noted, "Our members are highly appreciative of our environmentally friendly initiatives, which help to define the value of our brand." According to participants, sustainable practices the loyalty, satisfaction, and overall well-being of members, athletes, and staff. Emphasizing stakeholder satisfaction, Y5 said, "Our members’ loyalty grew, and our environmentally friendly business model attracted new clients." Analyzing of responses to the question, "What skills are required of managers to improve sustainability practices?" revealed four basic ideas which can be seen in table 9.

Table 9. Managerial Skills Required to Implement Sustainability Practices

Themes	Y 1	Y 2	Y 3	Y 4	Y 5	Y 6	Y 7	Y 8	Y 9	Y 10	Y 11	Y 12	Y 13	Y 14	Y 15	F
Management and strategic planning competencies	✓		✓	✓	✓			✓	✓	✓		✓		✓	✓	10
Leadership, communication and training skills		✓				✓	✓		✓	✓	✓		✓	✓		8
Technological competencies	✓		✓		✓				✓			✓				5
Environmental and social awareness				✓		✓									✓	3

Y1-15: Participants codes; F: The frequency of responses, ✓: Participants who answered "Yes" to the corresponding item

However, to improve sustainability practices, most respondents emphasized the necessity for managers to possess strong strategic planning and financial management skills. For example, Participant Y1 emphasized the importance of these competencies by stating, “Managers should have financial management and strategic planning capabilities.” In addition, Participant Y1 claimed that effective communication, leadership, and training abilities are essential for fostering sustainable behavior within

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staff. As participant Y2 stated, “Prevention is essential, and to increase the awareness of employees and members, proper communication must exist. According to the participants, the best managers for facilitating sustainability measures are those with analytical thinking skills who keep up with technological developments. For instance, participant Y3 underlined the need of these skills by stating, "Successful managers are those who can keep up with technology." Environmentally and socially conscious administrators must take the lead in promoting sustainable behavior. Participant Y6 referred to "environmental cognizance, which needs to be in the arsenal of managers to elevate the sustainability of facilities." We identified four major themes from the participants' responses to the question: “What are your suggestions for the dissemination of sustainability practices in sports facilities throughout Türkiye?”

Table 10. Recommendations for the Dissemination of Sustainability Practices

Themes	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	F
Support incentives	✓				✓	✓		✓			✓	✓	✓		✓	8
Education and awareness-raising activities		✓	✓	✓					✓	✓				✓		6
Technological transformation and infrastructure improvement	✓			✓			✓					✓			✓	5
Utilizing mechanisms that encourage success								✓			✓			✓		3

Y1-15: Participants codes; F: The frequency of responses, ✓: Participants who answered "Yes" to the corresponding item

Participants stated that the promotion of sustainability practices depends on the expansion of incentive programs and financial resources. For example, participant Y12 emphasized the importance of government support, stating, “State support should be significantly increased for transitioning to renewables.” Many responses emphasized the importance of educational initiatives and awareness-raising public campaigns to sensitize individuals and increase awareness of sustainability. As one participant (Y10) suggested, “Regular sustainability training for facility managers and personnel should be provided,” underscoring the need to expand educational efforts. Additionally, participants advocated for accelerating technological transitions to develop sustainable infrastructure within sports facilities. For instance, a Y7 respondent underscored the necessity of implementing mandatory solar panels and motion-sensor lighting in the facility infrastructure. Participants also highlighted the importance of promoting successful sustainability initiatives, stating, “If we rewarded and highlighted our winners, they would serve as models for other sports sites”.. Participant Y11 strongly believed in the importance of incentive mechanisms among various stakeholders, linking successful ecosystem preservation projects to “incentives and prizes.” In addition to the dominant themes, a few participants’ views were also expressed. For example, technological investments mentioned by only a small number of participants, with participant Y7 advocating for the integration of renewable energy technologies into infrastructure. Similarly, training sessions mentioned by only a limited number of respondents, reflecting a diversity of strategies for staff awareness across facilities. These minority perspectives highlight the

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diversity in managers' approaches to sustainability. To support these findings, a summary table of the most frequently reported challenges and suggested solutions is presented in Appendix A.

DISCUSSION

This study employs a qualitative research methodology, using semi-structured interviews with sports facility administrators to explore sustainability strategies in facility operations and planning.. Data were collected through interviews with 15 sports facility managers in Istanbul. Participants were selected based on their position and experience managing a range of sports facilities, from small sports halls to large stadiums.

Facility managers define sustainable operations as those designed to create green spaces, conserve energy and water, use environmentally friendly materials, and facilitate waste collection and disposal. These perspectives were echoed by most participants, exemplified by Participant Y3, who noted the importance of integrating waste reduction and environmentally friendly resource use into facility planning. These definitions align with sustainable practices reported by Akinwusi (2024) in a comparative study of facility managers in Germany and developing countries. That study found that managers defined sustainable operations primarily in terms of energy and water conservation, waste management, and the use of environmentally friendly materials. Similarly, Olaniyi (2017) emphasizes the protection of green spaces and the efficient use of natural resources as key components of sustainability within the management framework he developed in Nigeria. These practices are consistent with the literature, which advocatesa comprehensive approach to sustainability in sports facility administration [15,16].

The particiapnts demonstrated diverse sustainability strategies through their objectives. These definitions were reflected in the views of most participants, exemplified by Participant Y3, who noted the importance of integrating waste reduction and the use of environmentally friendly resources into facility planning. With goals such as installing energy-efficient LED lighting, reducing single-use plastics, and transitioning to renewable energy sources like solar power, these efforts represent proactive sustainable environmental management practices. Furthermore, similar approaches are supported by studies in the literature [17–19]. Drawing on their expertise and analysis, the participants identified a list of critical facilitators expected to support the integration of sustainability practices into daily operations. These include public awareness, management commitment, access to technology, and educational activities. The effectiveness of such mechanisms was illustrated by Participant Y10's observation that regular staff training helped increase awareness of plastic reducatiom and general environmental practices among employees. This alligns with numerous studies in the literature that emphasize the importance of management support and training programs [20]. Additionally, aligning management actions with long-term goals improves resources efficiency and foster greater commitment staff to the organization [21].

However, numerous barriers were also identified, including economic constraints, inadequate infrastructure, low awareness among users and staff, and limited access to sustainable technologies. Participant Y6 underlined the importance of complying with international sustainability standards and emphasized that environmental awareness and knowledge sharing between facilities are critical for improving sustainable practices. These findings align with international literature indicaring that common challenges exist in implementing sustainability

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policies not only in Turkey but also across diverse geographic contexts. Studies from both developed and developing countries have shown that structural deficiencies and managers' difficulties in adopting strategic approaches hinder sustainability initiatives [8,15,16,22]. This demonstrates both the contextual specificity and the broader applicability of our study's findings. The literature is consistent in asserting that financial constraints are the most immediate barrier to the widespread adoption of improved sustainability practices [24]. Therefore, addressing these financial barriers through public policies, subsidies, and economic incentives is essential. Participants also noted that sustainability practices significantly impact operational efficiency, facility reputation, and stakeholder satisfaction, reinforcing both their legality and legitimacy. Sustainability efforts have been shown to enhance member loyalty, employee satisfaction, and brand equity. Recent studies in the sports industry support this, and brand equity. Recent studies in the sports industry support this, demonstrating a positive relationship between improved operational performance and the implementation of sustainable practices [25,26]. This research contributes to the growing body of literature that highlights the comparative advantages of engaging in sustainability-oriented facility management initiatives [27].

Innovative managers should possess skills such as strategic planning, financial management, leadership, communication, and environmental awareness to efficiently implement sustainability initiatives. These findings align with Sualeh Khattak et al. (2024), who emphasized that managerial competencies ─ particularly strategic planning, operational efficiency, and environmental awareness ─ are essential for resource management within sustainable development strategies, especially in SMEs. Similarily, Schiuma et al. (2024) highlighted the importance of transformative leadership skills, including vision-building, change management, and cross-functional communication, as key drivers of organizational sustainability during digital transformation processes [28,29]. Collectively, these studies affirm that strong management and leadership capabilities are very important for the successful integration and execution sustainability projects.

CONCLUSIONS

This study produced several significant conclusions that can inform future research and practice. Sustainability in Istanbul's sports facilities is primarily driven by targeted planning, efficient resource use, and educational campaigns. However, the two major challenges persist; limited infrastructure and insufficient financial resources. These constraints hinder progress toward sustainability. Addressing them requires strengthening inter-facility collaboration, improving infrastructure, and securing adequate funding sources.

In addition to ongoing efforts, greater government support and broader educational programs are essential. Policies that offer tax incentives, subsidies, and improved access to sustainable technologies can help alleviate financial and infrastructure constraints. Furthermore, strengthening management and leadership capabilities is crucial for effective sports facility operations. Training programs aimed at enhancing sustainability integration should place strong emphasis on strategic planning, operational efficiency, and environmental literacy.

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Table 11. Difficulty–Solution Framework for Advancing Sustainability in Sports Facilities

Identified Challenges	Proposed Solution / Strategy
High implementation costs and financial constraints	Leverage public incentives and develop sponsorships;, implement of cost-effective technologies (e.g., LED, water-saving systems)
Technical limitations and structural deficiencies	Implement gradual infrastructure modernization, adopt sustainable materials and equipment, and invest in smart systems
Limited knowledge and awareness among staff	Provide targeted training courses for managers, implement awareness-raising programs for leadership, and integrate sustainability principles into institutional policies.
Lack of managerial support tools and strategic planning	Implement leadership training programs, enhance managerial awareness, and incorporate sustainability into institutional policies
Limited support from local institutions and authorities	Collaborate with city authories, support local sustainability projects, and streamline the grant application process.
High frequency of single-use plastic usage	Implement sustainable internal procurement policies prioritizing reusable products
Inadequate communication and education systems	Conduct regular information sessions for staff and users to share best practices, and implementincentive-based engagement strategies to encourage participation.

Finally, this study enhances our understanding of how sustainability is operationalized in sports facilities by highlighting both the contextual and universal factors influencing sustainable practices. These findings should guide future research and inform legislative initiatives aimed at supporting environmentally friendly management of sports facilities globally.

CONFLICT OF INTERESTS

No potential conflict of interest was reported by the authors.

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