

Green Tennis

Diagnostic Tools for Assessing
Sustainability in Tennis Players and
Club Professionals Report



**GreenTennis D2.2 – Report on Diagnostic Tools for Assessing Sustainability in
Tennis Players and Club Professionals**
ERASMUS-SPORT-2024 – Project ID: 101184588 – GreenTennis

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1. Executive Summary

This deliverable presents the development, adaptation and implementation of two methodological tools created within Work Package 2 (WP2) of the GreenTennis project (ERASMUS-SPORT-2024 – ID: 101184588), led by the Catholic University of Murcia (UCAM). This work package has played a central role in establishing the scientific and methodological foundations of the project, producing valid and reliable instruments for diagnosing the current state of sustainability within the European tennis ecosystem.

The first instrument, GreenTennis–SUSYOUTH, assesses knowledge, attitudes, willingness to act, behaviour, self-efficacy and emotions related to sustainability among young tennis players. It was administered to a large and diverse sample of 463 athletes from 41 countries, with a mean age of 14.1 years. The findings reveal high levels of environmental awareness and a strong predisposition to act sustainably, although a gap remains between intention and daily practice. Female participants scored significantly higher than male participants in most items, while young players who had previously discussed sustainability topics within their clubs achieved higher scores across all dimensions. These results underline the importance of communication, environmental education and coaching leadership as key factors in the development of sustainable habits among young athletes.

The second instrument, GreenTennis–SUSCLUB, targeted 99 tennis professionals—including coaches, managers and tournament directors—from 28 countries. The tool examines five dimensions: knowledge, attitudes, current practices, barriers and needs, and self-efficacy and engagement. The results indicate highly positive attitudes towards sustainability and strong personal commitment, although specific practices are still in an early stage of development. The qualitative analysis of open-ended responses identified recurrent barriers such as a lack of resources, institutional support and specialised training. Among the reported good practices, recycling, water-saving measures and the replacement of lighting systems with LED technology stand out, together with emerging opportunities in renewable energy adoption and environmental leadership within clubs.

Taken together, these two instruments—focused respectively on the individual and organisational levels—offer an integrated perspective on the current state of sustainability in tennis, providing the empirical basis for the forthcoming GreenTennis Toolkit (WP3). This set of practical resources will translate the findings of WP2 into concrete actions for clubs,



coaches and managers, including operational guidelines, educational materials and sustainable governance strategies. Overall, the results of WP2 position GreenTennis as a European reference initiative for the study and promotion of sustainability in sport, consolidating a transferable, evidence-based methodological model for future application across different contexts.

2. Introduction

The GreenTennis project, developed within the framework of the Erasmus+ Sport programme (2024–2026), was conceived with the objective of promoting environmental, social and cultural sustainability within the European tennis sector. Tennis, a sport of considerable social relevance and global reach, faces specific challenges related to resource consumption, including water and energy use, waste management, mobility, and facility maintenance. At the same time, its strong presence in local communities makes tennis clubs privileged environments for environmental education and the adoption of responsible, sustainable practices.

Within this context, Work Package 2 (WP2), coordinated by the Catholic University of Murcia (UCAM), was conceived as the scientific phase of the project. Its main aim was to establish a robust empirical foundation to understand how different stakeholders within the tennis ecosystem perceive and apply sustainability principles. This work addressed a key gap identified in the GreenTennis Literature Review Report (UCAM, 2025), which highlighted the absence of sport-specific, validated instruments for assessing sustainability. Consequently, WP2 was tasked with designing and validating two complementary diagnostic tools: one aimed at young athletes (GreenTennis–SUSYOUTH) and another at coaches and club managers (GreenTennis–SUSCLUB).

The importance of WP2 extends beyond the technical development of the questionnaires. Its value lies in the ability to bridge academic research and real-world sporting practice. Both instruments were created through a rigorous process that combined a comprehensive literature review, an analysis of European sustainability policies, and consultation with international experts in sustainability, sport education and facility management. This multidisciplinary approach ensured that the tools were scientifically sound, contextually relevant, and adaptable to the diverse realities of European tennis.



WP2 therefore represents a decisive step towards establishing a standardised methodology for evaluating sustainability in sport from a multidimensional perspective. Unlike earlier studies focused primarily on perception or infrastructure, the GreenTennis approach integrates cognitive, emotional and behavioural factors, providing an inclusive understanding of sustainability as a cultural and operational practice. This comprehensive vision not only measures the level of awareness and commitment among the actors involved but also informs the design of more effective educational, training and organisational strategies.

WP2 serves as the methodological core of the GreenTennis project, from which future actions emerge: the GreenTennis Toolkit (WP3) and the training modules (WP4). Thanks to the tools created and validated during this phase, the consortium now has a common diagnostic and evaluation framework applicable across different countries and contexts, capable of guiding evidence-based decision-making and supporting a genuine sustainable transformation within European tennis.

3. Methodological Framework

The methodological framework of the GreenTennis project combines theoretical and empirical approaches in a balanced manner, with the aim of ensuring scientific validity, practical applicability, and alignment with European policies on sustainability and sport. This integrative approach enabled the design, adaptation, and implementation of two complementary tools — GreenTennis–SUSYOUTH and GreenTennis–SUSCLUB — developed to diagnose the level of knowledge, attitudes, practices, and competences related to sustainability within the tennis context.

The methodological development was grounded on three key pillars. Firstly, the European policy framework, represented by the European Green Deal and the United Nations 2030 Agenda, which guide sport's commitment to the Sustainable Development Goals (SDGs), particularly SDG 4 (Quality Education), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action). Secondly, international sport sustainability strategies, notably the IOC Sustainability Strategy (2017) and the ITF Operational Sustainability Report (2022), which promote the integration of Environmental, Social and Governance (ESG) principles into sport organisations. Thirdly, the academic and scientific approach, based on the model proposed by Salahange et al. (2024), who developed and



validated a multidimensional instrument for assessing sustainability perception among university students (Discover Sustainability). This model served as the foundation for structuring the cognitive, attitudinal, behavioural, self-efficacy, and emotional dimensions of the GreenTennis questionnaires.

Building on these references, the GreenTennis Literature Review Report (UCAM, 2025) consolidated the conceptual framework of WP2 by identifying six key areas of intervention in tennis: energy management, water efficiency, sustainable mobility, waste reduction, environmental awareness, and preservation of sporting and cultural heritage. These areas were translated into the thematic dimensions of the SUSYOUTH and SUSCLUB instruments, ensuring direct coherence between theory, policy, and practice.

The empirical approach was based on a rigorous process of design and validation. An interdisciplinary panel of ten international experts in sustainability, sport management, psychology, physical education, and assessment was established. Through three iterative rounds of review, the expert group successfully adapted the wording and content of the items to the real context of tennis clubs and academies, balanced the representation of theoretical dimensions, and ensured cultural and linguistic adequacy in the English version and six additional languages used by partner countries. This process followed a formal expert methodology for the cross-cultural adaptation of questionnaires, ensuring conceptual equivalence and contextual relevance across linguistic versions.

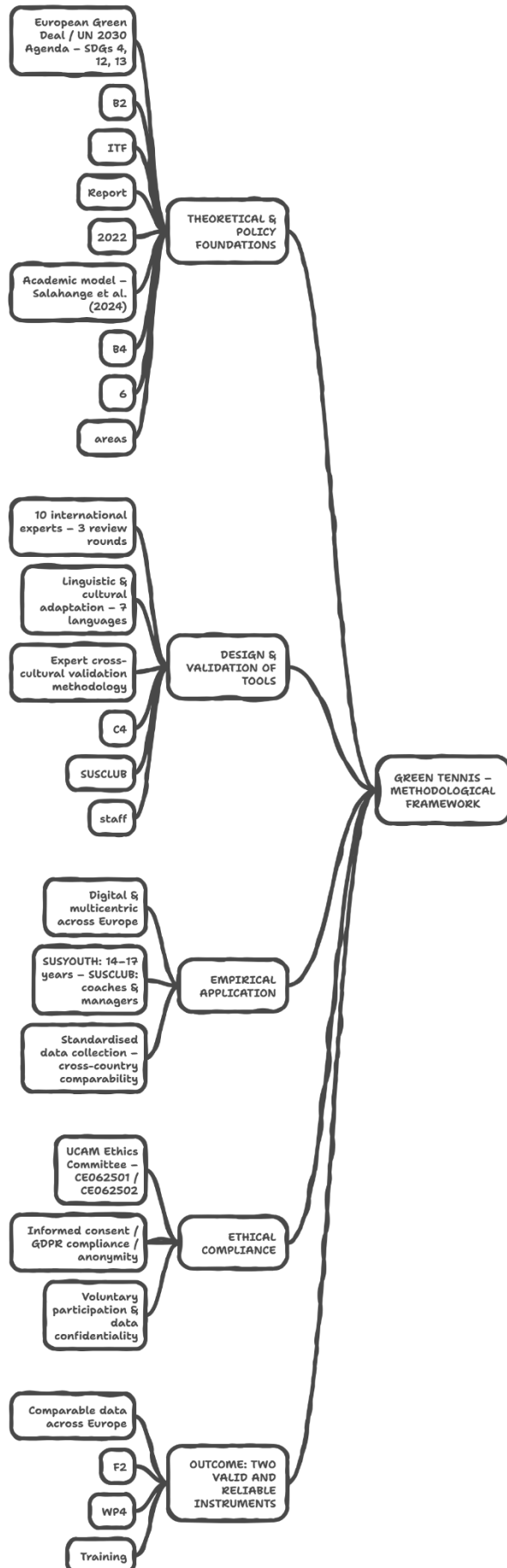
The implementation of both instruments was digital and multicentric, involving the participation of clubs, academies, and national federations from multiple European countries. The GreenTennis–SUSYOUTH questionnaire targeted young players aged 14 to 17 years, while the GreenTennis–SUSCLUB instrument was applied to coaches, managers, and technical directors. Both tools followed a standardised administration protocol that guaranteed data comparability across countries and institutional contexts.

All procedures were carried out under strict ethical research standards, approved by the Ethics Committee of the Catholic University of Murcia (UCAM). Two independent protocols were registered: CE062501 for the study involving young athletes, and CE062502 for the study involving tennis professionals. In both cases, participation was voluntary and anonymous, with informed consent obtained (from participants or their legal guardians in the case of minors),

confidentiality of personal data guaranteed, and compliance ensured with the General Data Protection Regulation (GDPR) of the European Union.

Consequently, WP2 was structured as a comprehensive scientific process integrating policy and literature review, expert validation, cross-cultural and linguistic adaptation, empirical application, and ethical compliance. The result was the creation of two valid, reliable, and operationally adapted instruments tailored to the tennis environment, providing comparable data at the European level and laying the groundwork for the next project phases — namely WP3 (GreenTennis Toolkit) and WP4 (Training and Transfer)





4. Development of the Diagnostic Tools

4.1 GreenTennis–SUSYOUTH

The GreenTennis–SUSYOUTH questionnaire was designed to assess environmental awareness and attitudes towards sustainability among young tennis players aged 10 to 20, with a particular focus on the 14–17 age group, corresponding to key developmental stages in youth sport. A total of 463 athletes from 41 countries participated, with a mean age of 14.1 ± 2.17 years, giving the study a broad and representative international perspective.

The instrument comprises 33 items distributed across six theoretical dimensions: Knowledge, Attitudes, Willingness to Act, Behaviour, Self-Efficacy, and Emotional Dimension. Each item was rated on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). The psychometric properties showed high internal consistency across all subscales ($\alpha = 0.738\text{--}0.916$), confirming the robustness of the tool.

Data collection was conducted digitally through the Webropol platform during August and September 2025. Participating organisations included tennis clubs, academies, and educational institutions offering youth tennis programmes.

The descriptive analysis revealed very high levels of environmental awareness (Knowledge $M = 4.34 \pm 0.03$) and positive attitudes towards sustainability ($M = 4.19 \pm 0.03$), together with a strong willingness to act ($M = 4.31 \pm 0.03$). Indicators of sustainable behaviour were slightly lower ($M = 3.98 \pm 0.03$), suggesting the existence of a gap between environmental knowledge and everyday practice. The self-efficacy dimension ($M = 3.88 \pm 0.03$) reflected moderate confidence in initiating sustainable actions.

Emotionally, 69 % of players reported feelings of worry or frustration when thinking about environmental problems, whereas positive emotions such as satisfaction, pride, and hope were associated with engaging in sustainable behaviour. This emotional pattern highlights the importance of transforming concern into proactive and responsible behaviour.

Gender analysis revealed statistically significant differences in 21 out of 33 items ($p < 0.05$), with female participants scoring higher in most dimensions—particularly in attitudes, willingness to act, and emotional sensitivity. Furthermore, players who had previously discussed sustainability issues at their club or with their coach scored higher across all

dimensions, confirming the crucial role of communication and environmental education within the sporting environment.

Overall, the GreenTennis–SUSYOUTH questionnaire proved to be an effective instrument for measuring young tennis players’ awareness, emotions, and readiness to act sustainably. It provides a solid foundation for designing educational programmes and pedagogical strategies aimed at fostering behavioural change within clubs and academies.



GreenTennis–SUSYOUTH Questionnaire Results



4.2 GreenTennis–SUSCLUB

The GreenTennis–SUSCLUB questionnaire was developed to evaluate the level of knowledge, attitudes, practices, barriers, and personal engagement in sustainability among tennis professionals. The sample comprised 99 participants from 28 European countries, with a mean age of 48 ± 11.9 years and an average of 29 years of professional experience in the tennis sector. It included coaches (55 %), club managers (14 %), and tournament directors (15 %), providing a diverse representation of professional roles within the tennis ecosystem.

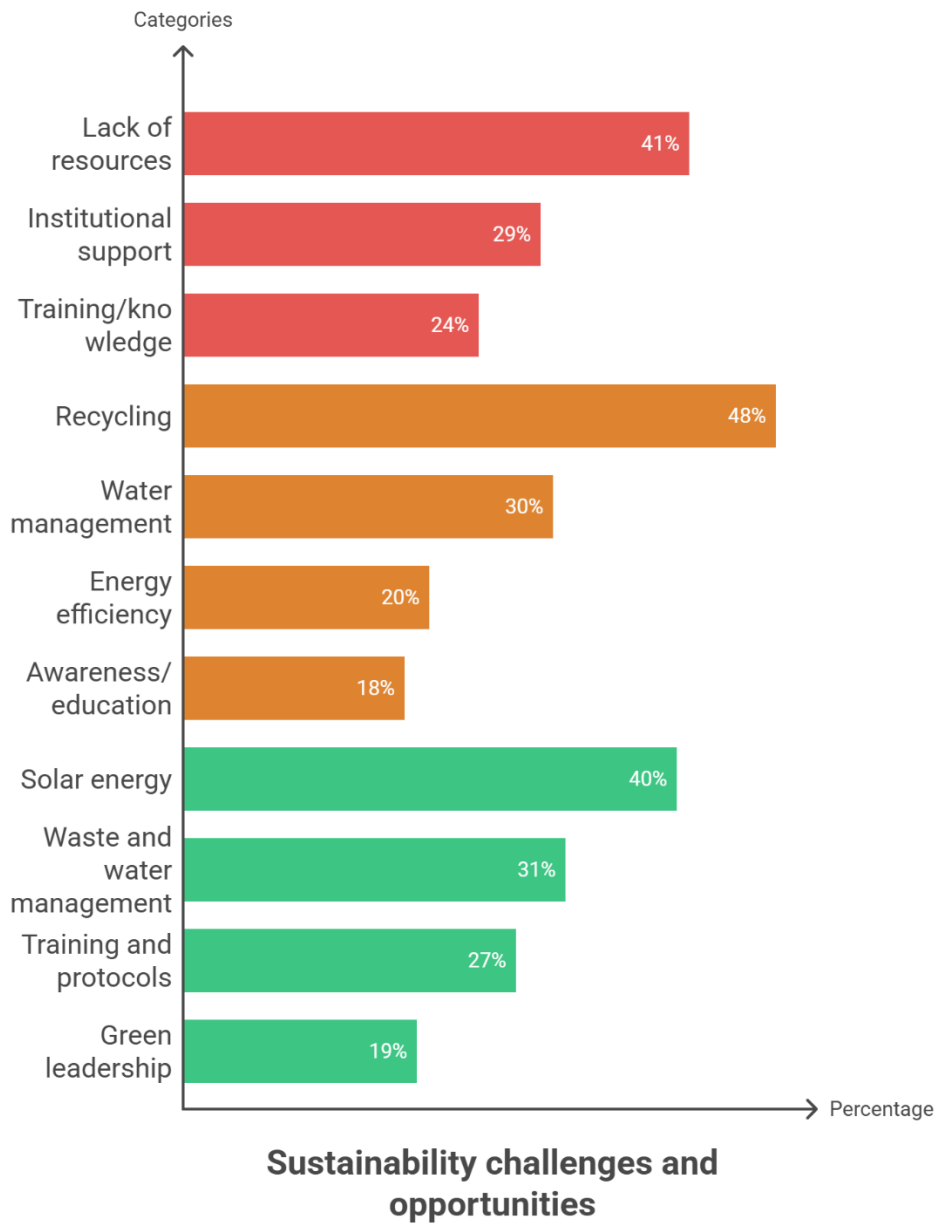


The instrument contained 25 Likert-type items and three open-ended questions, grouped into five dimensions: Knowledge, Attitudes, Current Practices, Barriers and Needs, and Self-Efficacy and Engagement. Reliability coefficients ranged from $\alpha = 0.82$ to 0.87 , indicating good to excellent internal consistency, while the Barriers and Needs subscale ($\alpha = 0.53$) showed acceptable coherence given its heterogeneous content.

Quantitative results indicated very positive attitudes towards sustainability ($M = 4.01$) and high levels of personal engagement ($M = 3.71$), although sustainable practices ($M = 3.47$)

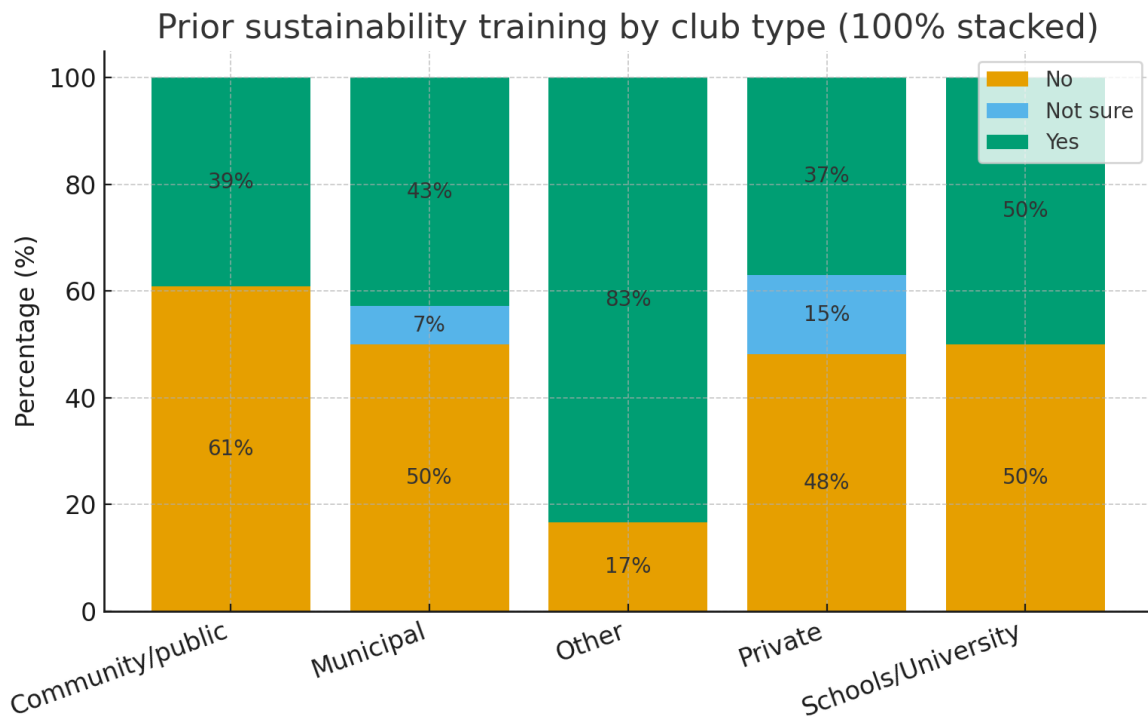
and technical knowledge ($M = 3.53$) remain at a developing stage. Participants with prior training in sustainability scored significantly higher in both Knowledge ($p < 0.001$) and Practices ($p = 0.011$), confirming the positive effect of targeted professional education.

The qualitative analysis, conducted using NVivo 14, identified three overarching thematic categories: structural barriers, good practices, and future opportunities. The most frequently reported barriers were lack of financial resources (41 %), limited institutional support (29 %), and insufficient training or technical knowledge (24 %). Among the good practices, the most common were recycling (48 %), responsible water management (30 %), energy efficiency (20 %), and environmental education initiatives (18 %). The emerging opportunities focused on solar energy adoption (40 %), integrated waste and water management (31 %), the establishment of sustainability protocols (27 %), and the promotion of environmental leadership within clubs (19 %).



Differences were also observed according to club type. Community and public clubs reported a lower proportion of professionals with sustainability training (61 % untrained), whereas private academies and university-based clubs showed higher levels of trained staff (between 50 % and 83 % affirmative responses). This pattern suggests that institutions with stronger educational orientation or greater access to resources are more likely to integrate sustainability practices within their organisational structure.





Taken together, the GreenTennis–SUSCLUB results provide a detailed and accurate picture of the current state of sustainability in European tennis clubs. While there is a widespread environmental awareness and positive attitude, the findings reveal structural constraints that hinder the systematic implementation of sustainable policies. Continuous training, internal leadership, and institutional support emerge as key elements to drive a genuine and lasting culture of sustainability within professional tennis.

5. Integrated Discussion

The results obtained through the GreenTennis–SUSYOUTH and GreenTennis–SUSCLUB instruments provide a complementary and coherent overview of the current state of sustainability within the European tennis ecosystem. The convergence between the

individual diagnosis of young players and the organisational assessment of tennis clubs reveals a context in which environmental awareness and sustainable intentions are high, but practical and structural implementation still requires consolidation.








In the case of young athletes, the GreenTennis–SUSYOUTH data reflect a highly aware and environmentally conscious profile. Participants demonstrate a solid understanding of sustainability and very positive attitudes towards environmental protection, accompanied by a strong willingness to act. However, the analysis also reveals a notable gap between theoretical understanding and everyday practice, as behaviour scores were lower than those for knowledge and attitudes. This pattern, well-documented in environmental education research, indicates that knowledge alone does not ensure action, and that an educational and motivational environment is essential to translate values into observable and consistent behaviours.

The emotional dimension adds an important interpretative layer. A considerable proportion of players (69%) associate sustainability with negative emotions such as worry or frustration, revealing a strong critical awareness of environmental problems. Nevertheless, positive emotions such as pride and satisfaction emerged when players engaged in sustainable actions, demonstrating the capacity of sport to channel emotions into constructive action. This emotional balance confirms the educational potential of tennis to create meaningful experiences that transform concern into environmental commitment.

The gender effect observed in the SUSYOUTH results is equally significant. Female players scored higher across most dimensions, particularly in emotional sensitivity, willingness to act and environmental empathy. These findings are consistent with existing literature (Salahange et al., 2024; Dingle & Mallen, 2021), which links gender differences with greater environmental awareness and pro-social orientation. Moreover, the fact that players who had previously discussed sustainability topics in their clubs scored higher in all dimensions underscores the influence of communication, educational context and coaching leadership in shaping environmental responsibility during formative stages.



Overview of GreenTennis–SUSYOUTH Data

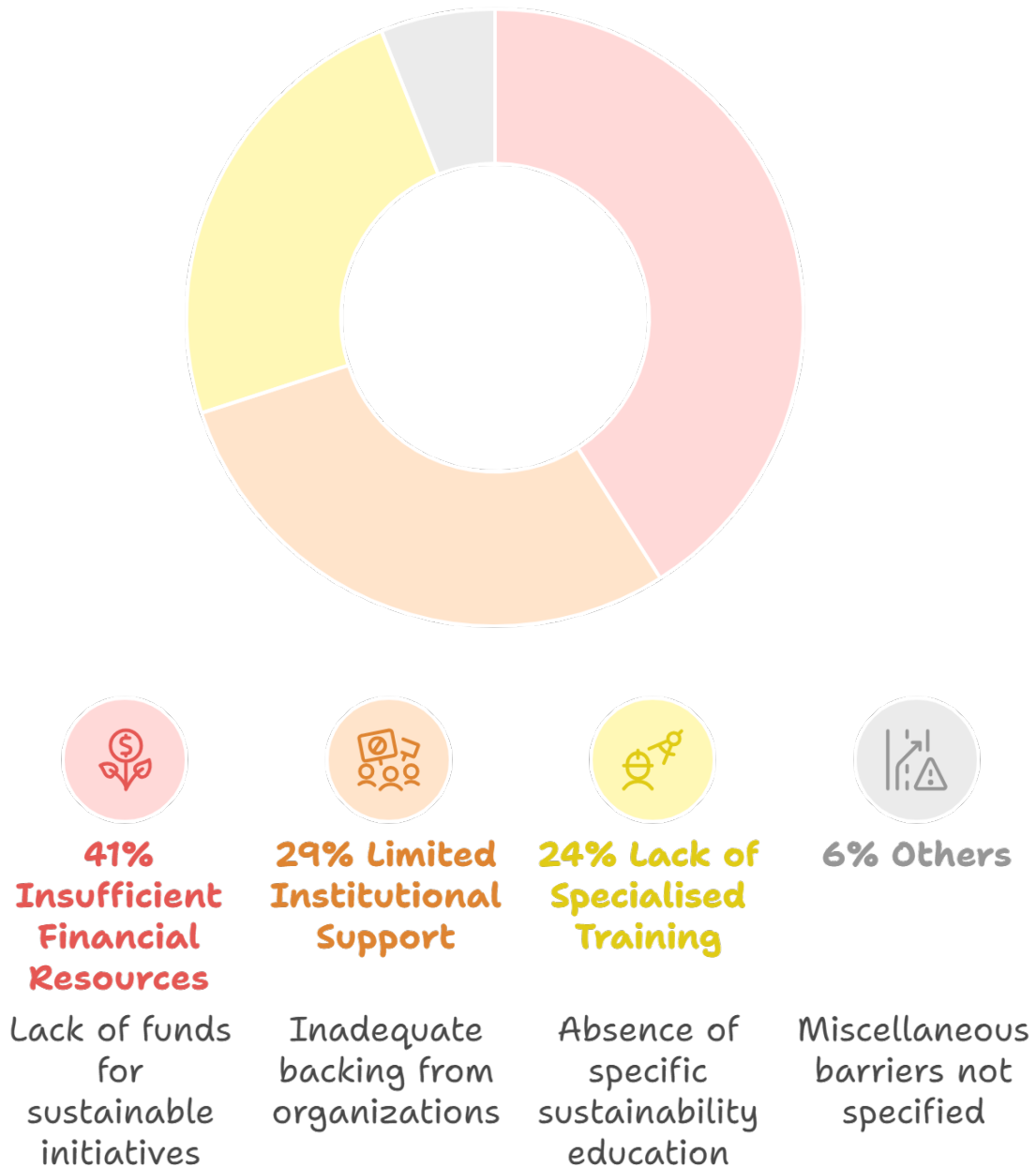
Characteristic	GreenTennis–SUSYOUTH (Young Athletes)
 Environmental Awareness	High
 Attitudes	Very Positive
 Willingness to Act	Strong
 Behaviour	Lower than Knowledge/Attitudes
 Emotional Dimension	Worry/Frustration (69%), Pride/Satisfaction (Sustainable Actions)
 Gender Effect	Females score higher
 Influence of Communication	High

On the organisational level, the GreenTennis–SUSCLUB findings offer a broader perspective on the professional and managerial sphere of tennis clubs — the settings where actual operational decisions are made. The results reveal very positive attitudes towards sustainability (M = 4.01) and strong personal engagement (M = 3.71), indicating that the topic is widely valued across the sector. However, current practices (M = 3.47) and technical knowledge (M = 3.53) remain at developing levels, suggesting that while professionals recognise the importance of sustainability, they still lack the training, tools, or institutional support necessary to implement it systematically in their daily work.

The qualitative analysis provides further insight into these findings by identifying the structural barriers that limit sustainable development in tennis clubs. The most frequently reported obstacles include insufficient financial resources (41%), limited institutional support (29%), and lack of specialised training (24%). These limitations are consistent with other European sport sustainability studies (IOC, 2017; ITF, 2022). At the same time, the presence of positive initiatives such as recycling (48%), responsible water management (30%), and energy-efficient lighting systems (20%) demonstrates that many clubs are already implementing partial yet tangible sustainability actions. Such initiatives, though fragmented, represent an encouraging starting point for building a coherent sustainability culture within the tennis community.

The opportunities identified —including solar energy (40%), integrated waste and water management (31%), the creation of sustainability protocols (27%), and the promotion of environmental leadership (19%)— confirm that clubs have substantial potential for improvement if provided with appropriate technical guidance and reference models. Notably, a higher proportion of professionals with sustainability training was found in private academies and university-based clubs, where educational settings and access to resources tend to facilitate innovation and knowledge transfer. In contrast, community and municipal clubs showed lower levels of training (61% without any prior education), reflecting disparities in institutional resources and the need for targeted support.

Structural Barriers to Sustainability in Tennis Clubs



Taken together, the results from both instruments link individual awareness with organisational reality. While young players express a strong desire to act sustainably, clubs

often face structural constraints that hinder the consistent application of sustainable practices. This duality indicates that sustainability in sport cannot rely solely on individual awareness; it requires an institutional framework that reinforces coherence between values and action. Environmental education, professional training, and resource management must therefore operate synergistically to promote meaningful change within the tennis sector.



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