

Sustainability and Economic Responsibility in Tennis Tournaments

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Abstract: In recent years, sustainability has become important for professional sports, including tennis. For example, major tournaments such as Wimbledon, the U.S. Open, and the Australian Open have taken steps to ensure economic stability in response to environmental change. This study investigates the balance between ecological building responsibilities, development, and economic interests in these high-level professional tennis tournaments. The study focuses on how tennis tournaments identify ecological issues and implement measures to protect them, such as alternative methods of addressing wasteful consumption such as renewable energy. In addition, the study analyzes and evaluates the economic outcomes and impacts brought about through tournament reports, sponsorship agreements, and media coverage. The results of the study suggest that although achieving a balance between sustainability and economic goals is a complex task, it is critical to the future of tennis, as sustainability is key to the sport's longevity and allows tennis to maximize its benefits in maintaining its relationships with fans, sponsors, and hosts.

Keywords: Ecological Sustainability, Tennis, Economic and Environmental.

1. Introduction

The environmental footprint of global sporting events is a growing concern. As one of the four major tennis championships in the world—Wimbledon, the US Open, the French Open, and the Australian Open—these events bring huge economic benefits and have a profound impact on the environment. Organizers of these tournaments have to deal with ecological pressures such as energy consumption, carbon emissions, waste management, and public transportation while ensuring the success of the events. In recent years, as the global climate crisis has intensified, sports event organizers have come to realize that environmental responsibility and economic sustainability are not mutually exclusive, but rather complementary. International tennis tournaments, especially Grand Slam tournaments, have adopted numerous environmental measures, such as the use of renewable energy, reduction of plastic waste, promotion of green transportation, and the introduction of smart technologies, to achieve the goal of sustainable development. In addition, these events also make extensive use of public awareness campaigns to educate spectators about sustainable practices, working to foster a culture of environmental stewardship within the sporting community. This study primarily uses a mixed-methods approach, combining qualitative and quantitative research methods. Data collected from tournament reports, interviews with tournament organizers, and financial statements will provide a comprehensive picture of the reality of tennis sustainability. Additionally, surveys of

spectators and sponsors will be conducted to assess their awareness and perceptions of these sustainability efforts. Quantitative analysis, including statistical modeling, effectively assesses the correlation between implemented sustainability measures and economic outcomes. This study aims to analyze the sustainability measures in tennis tournaments and explore their impact on the tournament's economy, ultimately proposing recommendations for future tennis tournaments in terms of balancing economic and environmental considerations.

2. Status and Causes of Environmental Pollution in Sports Events

2.1. Status of Environmental Pollution

Continuous increases in carbon emissions pose a significant threat to the global climate and have severely affected the living environment of humans. The environmental impact of carbon emissions from sports events is a key area of concern for researchers. Before and after a sports event, a series of economic activities at the host site will undoubtedly produce a large amount of carbon dioxide emissions. As the highest level and most important social, economic, and cultural activities in human society, international large-scale sports events (e.g., the Olympic Games, the World Cup, and top professional leagues) always have a significant impact on carbon emissions, especially in the construction of venues, venue operation, transportation, and other event-related activities, which will generate a large amount of carbon emissions. In particular, the level, scale, number of spectators, and sports programs of the event determine the total amount of carbon emissions of large-scale sports events. According to the International Energy Agency (IEA), global carbon dioxide emissions in 2022 are expected to exceed 33 billion tons. In terms of sports, the carbon emissions of the 2022 Qatar Football World Cup alone are expected to be about 3.63 million tons, accounting for ten-thousandth of the total global emissions. The 2018 World Cup in Russia produced a total of 2.16 million tons of carbon dioxide during the four-year preparatory period; the two consecutive World Cups not only produced huge carbon emissions but also saw a significant increase. Also, the consequences of these events often lead to extensive ecological restoration work, which involves additional unnecessary expenditures of resources and investments. During the period of large-scale sports events, the large number of people flocking to the host city can lead to a sharp increase in the amount of domestic garbage and sewage discharge, which can easily lead to environmental pollution [1].

2.2. Causes of Environmental Pollution

The environmental pollution of tennis tournaments is mainly in the following aspects:

- 1) Large-scale spectator mobility: The tournament attracts fans from all over the world to the competition venue, and transportation emissions become a significant source of pollution, particularly during the four major tennis tournaments and other large-scale single-sport events. Athletes and spectators traveling to these events will generate a considerable amount of carbon emissions from transportation [2].
- 2) Energy-intensive infrastructure: The preparation stage of sports events typically involves the construction of numerous venues. Among these, the construction of large stadiums and ancillary facilities is often a crucial undertaking, and city organizers raise substantial funds through various channels to build stadiums that meet the requirements of the event [3]. The energy requirements for lighting, air-conditioning, and other facilities in large stadiums are huge, especially for event venues that need to operate continuously for 24 hours.
- 3) Inadequate waste disposal: A large amount of waste is generated during tournaments, such as tennis balls that deteriorate or are destroyed within just a few games by players and often need to be replaced. These balls contribute significantly to the carbon footprint, as they can take up to 400 years to decompose. Additionally, single-use plastics and food packaging often

increase the burden on waste management systems. Environmental burden of sponsor activities: Many tournament sponsors contribute to waste and emissions through activities such as on-site promotions. For example, promotional activities by food and beverage sponsors can exacerbate the use of single-use plastics and increase packaging waste.

3. Implementation of Sustainability Measures in Tennis

3.1. Plastic Use and Waste Management at Tennis

In recent years, tennis tournaments have made notable strides in reducing plastic use and improving waste management. At the Wimbledon Championships, tennis balls deteriorate and even break down within a few sets due to the high intensity of play, requiring frequent replacements. Approximately 55,000 tennis balls are used during Wimbledon each year (Data from Low Carbon Operation Mode of Large High Power Consumption Venues Based on Big Data Mining Technology). These balls cannot be recycled and end up in landfills, where the rubber takes up to 400 years to decompose, causing significant environmental harm. The International Tennis Federation (ITF) is currently working on developing a sustainable tennis ball without a fabric covering, designed to replace the traditional rubber and felt materials. This innovation not only reduces dependence on natural resources but also lowers the impact on the environment. It is also working on adjusting the rules regarding ball changes and exploring ways to extend the life of tennis balls, such as by re-pressurizing used balls [4]. The Czech company Dropp is committed to the sustainable development of tennis and has recycled approximately 330,000 used tennis balls. These recycled balls are repurposed into soft flooring, shoe soles, and sports surfaces, contributing to global sustainability efforts. In turn, educational campaigns have been conducted to educate the general public, including players and audiences, about the importance of proper disposal and recycling. Dropp's initiative not only solves the problem of disposal of used tennis balls but also provides a viable solution for the circular economy, demonstrating the company's sense of responsibility for environmental protection.

3.2. Environmental Infrastructure

Tournament organizers are increasingly focusing on environmentally friendly venue infrastructure to achieve the goal of sustainable development. In 2019, the Roland Garros French Open pioneered the use of low-carbon, eco-friendly red clay made from natural ores. This innovative material not only excels in environmental protection but also effectively meets the tournament's practical needs. Compared to traditional materials, this eco-friendly red clay significantly reduces environmental harm, as it does not produce any toxic chemicals, construction waste, or plastic by-products. Additionally, the clay can be reused multiple times, offering high recycling value and a lifespan of over 100 years [5]. This longevity not only helps reduce resource consumption but also demonstrates the event organizers' commitment to environmental sustainability. As well as the implementation of these sustainable practices has also heavily inspired similar initiatives at other sporting events, creating a positive ripple effect that encourages wider eco-consciousness and appeals to the masses about environmental protection. Therefore, the calcined red brick pellets used in many venues have placed considerable pressure on the environment due to their non-reusable nature. The pollution generated at the end of a major tournament is substantial and irreversible. In contrast, the use of eco-friendly red clay aligns with the concept of long-term sustainability for humanity and promotes broader ecological awareness. This initiative illustrates how sporting events can maintain a high level of competition while actively engaging in environmental efforts, setting a positive example for other industries to follow.

3.3. Carbon Emissions and Energy Management

The management of carbon emissions at international tennis tournaments is increasingly becoming a focal point of discussion. In 2017, the French Open's organizers signed onto a French environmental protection program, which includes fifteen environmental commitments developed in partnership with the French Ministry of Sport and the Worldwide Fund for Nature (WWF). These commitments include ensuring that at least 80% of trips are made using human-powered transportation (such as walking, cycling, scooters, roller skates, etc.), public transport, or car sharing, along with 100% control and optimization of energy and water consumption. Targeted programs under this commitment include zero water waste, 100% lighting shutdown when not necessary, watering with non-potable water, and zero pesticide measures for the protection and management of plant landscapes [6]. Not only that but the involvement of the local community in these sustainable programs fosters and exercises a sense of ownership and pride, further promoting the development of environmentally friendly behaviors beyond the event. Wimbledon has also promoted a recycled cup policy since 2021, beginning with cold cups and expanding to include hot cups in 2022, with no plastic straws or stirrers. The introduction of recycled cups along with a deposit mechanism has successfully reduced the significant amount of waste caused by discarded cups [7].

4. Balancing Financial Responsibility and Sustainability

4.1. Collaboration with Eco-Friendly Brands

The financial structure of tennis tournaments heavily relies on sponsorship support, making the sustainability of these events closely tied to sponsorship partnerships. By partnering with eco-friendly brands, the event not only enhances its sense of environmental responsibility but also attracts more socially responsible sponsors. During the 2021 U.S. Open, Evian mineral water bottles used at the tournament were collected and sent to Rothy's, a U.S.-based sustainable and eco-friendly footwear brand, to create a limited edition co-branded tennis capsule collection. This creative collaboration not only showcases the two's shared vision in the field of environmental protection but also provides viewers with a unique selection of products. This was Rothy's first tennis product line since its founding in 2016. As the official water sponsor of the event, Evian aimed to recycle nearly 10 tons of plastic, preventing it from ending up in landfills through its recycling initiative [8]. This action not only reduces environmental pollution but also demonstrates the company's sense of responsibility in addressing the global plastics crisis, which in turn attracts the public's favor and support for this company. In addition, these collaborations often result in more visibility and marketing opportunities for the event and the brand, with not only the brand receiving attention but also the event organizing committee receiving fund assistance and visibility benefits, creating a synergistic effect that benefits all parties involved and maximizes the benefits for all. Committed to finding recycling solutions for waste disposal, approximately 72,000 Evian water bottles were processed during the event. Such efforts certainly add green value to the tournament as well. These collaborations not only enhance the environmental image of the event but also strengthen the interaction between sponsors and spectators. Spectators can not only feel the competitive atmosphere of the event but also participate in environmental initiatives, which enhances their connection to both the brand and the event. This win-win situation demonstrates the importance of sustainable development in modern sports events and provides a valuable reference for future cooperation models.

4.2. Economic Impact of Sustainability on Ticket Sales and Spectator Engagement

The economic impact of sustainability measures on ticket sales and spectator engagement is substantial. For instance, the French Open's environmental program has not only reduced carbon

emissions but also raised spectator awareness. This proactive approach has led to greater public consciousness about sustainability in sports, encouraging attendees to think critically about their environmental footprints. Similarly, Wimbledon has attracted a younger, more environmentally conscious audience by promoting its environmental initiatives. Incorporating sustainability into marketing strategies has proven to be effective in reaching relevant segments of this population and engaging environmentalists who would not have participated in the past, particularly young fans and environmental advocates, resulting in increased ticket sales and increased participation in sustainability programs, creating a more environmentally aware community around the tournament. Surveys from Wimbledon in 2021 reveal that over 75% of spectators support the tournament's environmental efforts, which not only enhances the brand image but also strengthens the long-term relationship between the tournament and its spectators.

5. The Sustainable Future of Tennis

5.1. Innovative Technologies for Continuous Improvement

Advances in technology have opened up new possibilities for the sustainable development of tennis tournaments. Technology is transforming the sport, becoming increasingly integrated into the game—from the traditional wooden tennis rackets to today's nano-carbon racquets and the increasingly advanced ball strings [9]. To make racquets lighter and enable players to hit the ball with more power and spin, tennis racquets have evolved from wood to metal. The hitting area has also doubled in size compared to traditional wooden racquets, providing players with greater freedom to strike the ball and facilitating faster skill improvement. Optimistically, these technological advances also tend to improve the durability and performance of equipment, which not only reduces the frequency of equipment replacement but also its environmental impact. Additionally, metal racquets are less prone to cracking and breaking, which reduces the reliance on wood and contributes to environmental protection.

5.2. Impact of Sustainability Measures on the Long-Term Economic Benefits

In the long run, the sustainability initiatives of tennis tournaments not only fulfill their environmental responsibilities but also yield significant financial rewards. By partnering with environmentally friendly brands, tournaments can attract more sponsors focused on sustainability, enhancing their environmental image and creating additional business opportunities. For example, Wimbledon is not only a prestigious tennis event but also the most catered sporting event in Europe. The high demand for food has led Wimbledon to prioritize sourcing local produce, with officials disclosing the sources of ingredients and transportation distances. This approach supports local agriculture while reducing transportation-related carbon emissions. Furthermore, as younger spectators become increasingly concerned about climate change and environmental issues, sustainable initiatives can help appeal to this demographic. For instance, the Australian Open's efforts to reduce carbon emissions and manage waste have attracted a significant number of Millennials and Generation Z viewers. A survey by Sports Business Journal found that 77% of Millennials believe a tournament's environmental policies influence their viewing choices. This trend suggests that the future success of tennis tournaments may hinge on their commitment to sustainability. As these viewers are likely to become the main consumers of tournaments in the future, tennis events are enhancing their long-term competitiveness through environmental initiatives. It is worth touting the fact that these efforts also resonate with consumers, influencing them to increasingly make choices based on environmental impacts, a strategic success for thereby increasing customer loyalty. These efforts are important actions that stabilize the customer base. Additionally, the return on investment for tennis tournaments is reflected in savings on operational costs [10]. For example, by using renewable energy sources, implementing

intelligent waste management systems, and developing energy-efficient facilities, tournaments have significantly reduced their energy expenses and waste disposal costs. These savings can help tournaments maintain higher profit margins and decrease their reliance on gate receipts.

6. Conclusion

Analyzing Wimbledon, the U.S. Open, and the French Open revealed that tennis tournaments have made significant progress in balancing sustainability with financial responsibility. By reducing carbon emissions, optimizing waste management, introducing green energy, and partnering with eco-friendly brands, these tournaments have not only minimized their environmental impact but also strengthened their financial positions and enhanced their overall brand image. However, challenges remain in achieving a comprehensive balance between sustainability and financial responsibility. Firstly, finding ways to further reduce carbon emissions from large-scale spectator movements is a significant issue that needs to be addressed. Implementing measures to protect against environmental harm by encouraging active use of public transportation such as buses, bicycles, or carpooling by all those involved in the event can help alleviate this challenge. Secondly, while progress has been made in reducing single-use plastics and waste disposal, there is still ample room for improvement. For example, encouraging more spectators and players to participate in environmental initiatives and finding ways to reduce energy consumption through technological innovations are crucial areas that warrant attention moving forward. Despite this, there are limitations to this study as most of the surveys done for this study were of the largest tennis tournaments, and these may not be able to generalize the sustainability practices of smaller or less funded tournaments. Therefore, my future research should be expanded to include more tournaments at different levels. Going forward, this study is able to provide more tennis tournaments with the confidence that their continued investment in innovative technology and close cooperation with local governments and environmental organizations will also play an important role in further reducing the environmental footprint of these tournaments and protecting the world's environment. Overall, as society becomes more environmentally conscious and technology continues to advance, tennis tournaments will play a pivotal role in sustainable development. Through ongoing innovation and improvement, these tournaments can not only maintain their economic benefits but also set a standard for sustainability for other sporting events.

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