

THE SIGNIFICANCE OF GREEN LOGISTICS IN CREATING SUSTAINABLE SPORTS EVENTS

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Abstract

Large-scale sporting events depend heavily on logistics and transportation, which have a big impact on sustainability. Large-scale events like the Olympics and the FIFA World Cup need detailed logistical planning, which raises carbon emissions, uses excessive amounts of energy, and generates a lot of waste. Addressing these social, economic, and environmental issues requires the use of green logistics. This study looks at sustainability issues in sports logistics, emphasising the value of green tactics, including waste management system adoption, renewable energy use, and transportation route optimisation. The article aims to suggest significant green logistics methods to enhance sustainability in sports events by using a comprehensive literature review. An analysis of research conducted between 2018 and 2025 shows that green logistics effectively reduces environmental impact while increasing operational effectiveness. According to the results, using sustainable logistics techniques improves economic effectiveness and corporate social responsibility while also reducing ecological footprints. In order to attain long-term sustainability and conform to international environmental standards, the study highlights the importance of integrating green logistics into sports event design.

Keywords: green logistics, sustainability, sports, sports events, logistics, sustainable sports events

Introduction

Logistics and transportation have been an important department in sports events, as 63 million U.S. dollars were used for logistics and transport in the FIFA World Cup held in Qatar (Statista, 2024). Moreover, Pott, Spiekermann, Breuer and Hompel (2023) highlighted, in their systematic review of logistics in sports, that 1.2 billion dollars were used for the logistics and transportation investment for the 2012 London Olympic Games. Similarly, logistics operations in sports events cause major sustainability issues which cause social, economic, and environmental problems. As a result, green logistics is important in creating sustainable sports events.

Large-scale sporting events produce a lot of waste, need a lot of energy, and involve a great number of transportation, all of which increase carbon emissions and pollution in the environment (Atalay and Švagždienė, 2023). Event planners should lessen their environmental impact by using sustainable logistical practices, such as using electric or hybrid cars, optimising transport routes, and depending on renewable energy. Ecological sustainability is further supported by efficient waste management techniques like composting and recycling (Nwabuwe and Odirin, 2024). Furthermore, by improving supply chain efficiency, green logistics not only lowers costs but also aids in preventing excessive resource usage. Incorporating sustainable logistics into sports event design has become essential rather than optional due to the rising worldwide concern about climate change. This method guarantees that sporting events benefit society and responsibly contribute to environmental protection.

Research aim: To suggest significant green logistics methods to enhance sustainability in sports events.

The following **objectives** have been set to achieve the aim:

1. To analyze the sustainability issues of logistics operations in sports events.
2. To explore the importance of green logistics in sports events.
3. To provide effective green logistics methods to reduce the environmental, economic, and social impact of sports events.

Research object and methods

Research object: Green logistics in sports events

A literature review is employed in the article to analyze the importance of green logistics in creating sustainable sports events. A comprehensive analysis of secondary sources published between 2018 to 2025 is taken to conduct the analysis. Implementing this method helps the article showcase an overview of effective green logistics methods that have been used by sports events worldwide.

Research results and discussion

Sustainability issues of logistics operations in sports events

According to a thematic study of logistical operations during sporting events, significant sustainability issues arise from the complexity of event planning, transportation, and resource allocation of sports events. Significant environmental effects result from the need for vast logistical networks to carry players, equipment, and spectators during major international sporting events like the Olympic Games, FIFA World Cup, and Formula 1 races (Chadwick et al., 2022).

The main sustainability issues with these logistical procedures include waste generation, excessive energy use, supply chain management inefficiencies, and transportation-related carbon emissions (Su et al., 2025). Reducing environmental damage and preserving smooth event operations depend on these issues being resolved.

Table 1. Carbon emission in larger-scale sports events

Race name	Venue	Year of organization	Carbon emission (tons)
Summer Olympic Games	Beijing, People's of China	2008	118
	London, United Kingdom	2012	340
	Rio de Janerio, Brazil	2016	450
	Tokyo, Japan	2020	301
	Paris, France	2024	158
Winter Olympic Games	Vancouver, Canada	2010	25
	Sochi, The Soviet Union	2014	52
	Pyeongchang, Korea	2018	159
	Beijing, People's of China	2022	130.6
World Cup	German	2006	25
	South Africa	2010	275
	Brazil	2014	227
	Russia	2018	216
	Qatar	2022	363

Source: Su et al., 2025

The substantial carbon footprint caused by transportation is a key sustainability concern in the logistics of sporting events. Thousands of players, officials, and supporters must travel, sometimes across international borders, for major athletic events. High greenhouse gas (GHG) emissions are caused by a large reliance on long-haul trucking, air travel, and other fuel-intensive transportation techniques (Wicker and Thormann, 2024). Logistics operations are a major environmental problem as freight transportation for broadcasting materials, sporting equipment, and venue infrastructure increases carbon emissions (Wicker and Thormann, 2024). Delivering products to stadiums and training grounds is known as "last-mile logistics," and it can exacerbate pollution and traffic in cities (Herold et al., 2022). Event planners can look at environmentally friendly transportation options like hydrogen or electric cars, streamline delivery routes, and promote public transit use to lessen the impact on the environment. One of the main sustainability issues in sports logistics is waste management. Significant garbage is produced by the vast number of attendees at important events, including plastic products, food containers, and advertising materials (Wicker and Thormann, 2024). Additionally, the transportation of goods and equipment results in packaging waste from logistical activities. Ineffective disposal techniques can lead to contamination, excessive landfill usage, and long-term environmental damage (Mariyam et al., 2022). Sports event planners and logistical companies could implement sustainable waste management techniques, such as recycling programs, composting, and reducing the usage of single-use plastics, to address this problem.

One major sustainability issue in the planning of sporting events is energy use. Large stadiums need a lot of energy to run their air conditioning, refrigeration, lighting, and broadcasting equipment (Zhang et al., 2022). Furthermore, a significant amount of fuel and power are used by logistical infrastructure, such as warehouses, distribution hubs, and transportation centres. Dependence on non-renewable energy sources leads to environmental deterioration and higher carbon emissions (Zhang et al., 2022). Logistics operations may use renewable energy sources like solar panels, wind turbines, and energy-efficient technology to improve sustainability (Mariyam et al., 2022). Energy usage may be further optimised and waste can be reduced by using smart logistics solutions, such as AI-driven energy management systems. The sustainability issues in sports event logistics are made worse by supply chain management inefficiencies. Resource waste is a result of inadequate distribution networks, excessive hoarding, and poor inventory control (Greenwell et al., 2024). Significant food waste results from the frequent wasted use of perishable goods like food and drinks. Event planners should use data-driven logistics techniques to improve supply chain efficiency, reduce excess inventory, and optimise inventory management to increase sustainability (Greenwell et al., 2024). Blockchain technology has the potential to decrease the environmental effect of unsustainable activities, increase transparency, and encourage ethical sourcing.

The logistical issues of social and economic sustainability in sporting events also need to be taken into consideration. Concerns over fair compensation, working conditions, and labour rights are raised by the significant dependence on temporary logistics workers (Greenwell et al., 2024). To guarantee that workers are treated fairly, logistics planning must take ethical labour practices into account. Furthermore, such sporting events may strain the community's infrastructure, resulting in traffic jams, noise pollution, and disturbances for locals (Greenwell et al., 2024). To lessen negative social effects, sustainable logistics methods should place a high priority on infrastructure improvements and community involvement. Transportation emissions, waste generation, excessive energy use, supply chain inefficiencies, and social problems are some of the sustainability issues that sports event logistics must deal with. Green logistics techniques, investments in sustainable technology, eco-friendly transportation, waste management programs, and renewable energy solutions should all be used by organisers to solve these problems and lessen their influence on the environment while preserving operational effectiveness.

Importance of green logistics in sports events

Green logistics, which minimises environmental effects, maximises resource utilisation and promotes social and economic well-being, is essential for enhancing the sustainability of sporting events (Nwabuwe and Odirin, 2024).

Adopting sustainable logistical techniques is necessary since major athletic events produce significant amounts of trash, carbon emissions, and resource usage. These include energy-saving techniques, sustainable procurement, eco-friendly transportation, and effective waste management, all of which support a more accountable and effective sports sector (Atalay and Švagždienė, 2023). Since lowering greenhouse gas emissions through the use of electric cars, biofuels, and public transit helps to reduce the carbon footprint of such events, green logistics offers significant environmental advantages (Herold et al., 2022). Recycling, composting, and the use of recyclable materials are waste management techniques that can help reduce pollution and waste disposal. Further reducing environmental damage is sustainable product procurement, which includes eco-friendly products and biodegradable food packaging (Zafari et al., 2025). Because energy-efficient solutions and route optimisation save fuel and trash disposal costs, green logistics for sporting events also have financial advantages. In addition to lowering electricity costs, using renewable energy sources like solar and wind ensures long-term financial viability (Zafari et al., 2025). Adopting paperless communication and digital ticketing also reduces the cost of printing and materials.

As more and more businesses promote events that are environmentally conscious, sponsorship and investment options increase. In addition to increasing cost-effectiveness, green logistics creates new business opportunities in environmentally friendly logistics and event planning (Pott et al., 2023). Socially, it promotes sustainable lifestyle choices by increasing awareness among athletes, fans, and organisers. Sports events may be used as forums to encourage community action and educate the public about environmental protection (Daddi et al., 2021). Collaboration and social responsibility are promoted when local communities are involved in waste management and sustainable infrastructure (Mariyam et al., 2022). Additionally, adding environmentally friendly elements to sporting venues, like green areas, adequate ventilation, and sustainable building practices, improves the experience and well-being of visitors (Elnour et al., 2022). Green logistics in sporting events improve the standing of host towns and organisers while advancing global environmental goals. Organisations and governments that put an emphasis on environmentally friendly activities are commended for their dedication to environmental responsibility (Cayolla et al., 2021). Additionally, these programs assist in meeting corporate social responsibility (CSR) norms and international environmental legislation. Stakeholders including sponsors, partners, and spectators are more likely to support ecologically conscious sporting events when sustainability becomes an increasingly important component of event design (Cayolla et al., 2021). Implementing green logistics guarantees long-term social, economic, and environmental sustainability.

Sports organisations may reduce their environmental impact while increasing productivity and community involvement by putting eco-friendly transportation, effective waste management, sustainable procurement, and energy-saving technologies into practice. In addition to being important for the sports industry's future, adopting green logistics shows a dedication to a more sustainable earth and an accountable global community.

Effective green logistics methods to reduce the environmental, economic, and social impact of sports events

Green logistics is essential to reduce the negative effects of major sporting events on the environment, the economy, and society. Because of the substantial energy consumption, waste output, and transportation requirements, it is imperative to implement sustainable logistics methods (Atalay and Švagždienė, 2023). In order to maintain social responsibility, increase economic efficiency, and promote environmental sustainability while guaranteeing seamless event operations, international sports organisations are putting several concepts into practice. Sustainable mobility planning, which lowers carbon emissions from the extensive travel of athletes, personnel, and spectators, is an essential component of green logistics (Herold et al., 2024). Event planners are addressing this by pushing electric vehicle (EV) infrastructure, shuttle services, and public transit more and more. For example, by providing free public transportation to spectators and implementing electric buses, the 2024 Olympic Games in Paris are putting a strong emphasis on low-carbon transportation (Brandler, 2024). To reduce reliance on private automobiles, the FIFA World Cup 2022 in Qatar has implemented an electric bus system and metro system (Al-Shaiba et al., 2023). Furthermore, encouraging bike infrastructure and ride-sharing reduces emissions and traffic congestion.

Improving energy efficiency and incorporating renewable energy sources is another essential method. Large quantities of energy are used by sports arenas for digital operations, transmission, lighting, and cooling (Daddi et al., 2021). Their carbon footprint may be considerably decreased by putting in solar panels, wind turbines, and LED lighting (Daddi et al., 2021). By using renewable electricity for its venues and hydrogen fuel cells to power the Olympic Village, the Tokyo 2020 Olympics established a new standard for sustainability (Russo et al., 2022). In a similar vein, the Mercedes-Benz Stadium in Atlanta, Georgia, USA, a prominent venue for football and soccer games, is LEED Platinum certified for sustainability and runs on renewable energy (Hassan and Ali, 2024). These programs reduce their negative effects on the environment while also saving money over time. Green logistics for sporting events must include efficient waste management and circular economy techniques. Large-scale events generate a lot of garbage from single-use plastics, advertising materials, and food packaging (Bjerke and Naess, 2021). Landfill waste may be greatly decreased by implementing waste segregation, composting, and recycling programs (Bjerke and Naess, 2021). The Wimbledon Tennis Championship, for example, has a zero-waste policy that prioritises recyclable cups and biodegradable packaging (Trendafilova et al., 2021). In a similar vein, the US Super Bowl has created a thorough waste diversion plan with the goal of recycling or composting more than 90% of its garbage (Brisman, 2022). Sports organisations may reduce their environmental impact and encourage sustainable customer behaviour by adopting the concepts of the circular economy.

Green logistics in sporting events are strengthened by incorporating eco-friendly products and sustainable procedures. Achieving sustainability goals is facilitated by giving preference to locally produced goods, biodegradable materials, and less single-use plastics (Cayolla et al., 2021). The UEFA European Football Championship, for instance, uses organic and locally produced foods to highlight sustainable food sourcing (Daddi et al., 2021). In a similar vein, the

Beijing 2022 Winter Olympics used low-emission materials and recycled steel in its venue building (Su et al., 2025). Sports events may reduce their carbon footprint while boosting local economies through implementing sustainable procurement practices into practice. In order to lessen the long-term environmental effects of large sporting events, emission reduction schemes and environmental rehabilitation initiatives are essential. To reduce emissions generated during the event, organisers are funding projects including afforestation, reforestation, and carbon credit schemes (Brisman, 2022). For example, Formula 1 wants to employ biofuels, reforestation initiatives, and environmentally friendly transportation to reach net-zero carbon emissions by 2030 (Næss and Chadwick, 2023). In a similar vein, the London Marathon supports tree-planting campaigns in partnership with carbon-offset organisations to offset its carbon impact (Wilby et al., 2022). Sports events may produce long-lasting societal benefits by involving communities and supporting social responsibility initiatives. Green logistics should promote social and economic well-being in addition to environmental concerns. Nowadays, a lot of international sporting events include volunteer-led sustainability projects, educational initiatives, and attempts to strengthen local economies. For example, social inclusion was given top priority at the 2022 Commonwealth Games in Birmingham, where local communities were actively involved in the development and execution of sustainable events (Buscarini et al., 2021).

Managing the environmental, economic, and social effects of sporting events requires the implementation of efficient green logistics methods, such as sustainable transportation, the use of renewable energy, waste reduction, eco-conscious procurement, carbon offset programs, and community involvement. To set greater sustainability standards and guarantee the ongoing success of important athletic events, international sporting organisations are gradually adopting these ideas.

Conclusions

1. Through a comprehensive literature review, it is found that significant sustainability issues affect sporting events, including high transportation-related carbon emissions, excessive waste generation, inefficient energy use, and supply chain inefficiencies. Reducing the negative effects on the environment, the economy, and society requires the adoption of sustainable practices.

2. Green logistics is essential for increasing sustainability since it reduces carbon emissions, improves resource efficiency, and promotes social responsibility. It combines sustainable mobility, efficient waste disposal, and renewable energy sources, resulting in long-term economic and environmental benefits.

3. The environmental, economic, and social effects of sporting events may be considerably lessened by employing methods, including sustainable transportation options, optimising supply chains, reducing waste, and using renewable energy sources. This will guarantee more responsible and effective logistical management.

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