

CLIMATE CHANGE AND SPORTS: A MULTIDIMENSIONAL RELATIONSHIP. CHALLENGES, ADAPTATION, AND SUSTAINABILITY

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Abstract: *Climate change is a global crisis that affects virtually all aspects of life. In recent years, it has become increasingly evident that the world of sports is not immune to its impacts. The consequences of climate change for sports are not yet clear, and the effects of the environment on sports are still poorly investigated. Rising temperatures, extreme weather events, and changing playing conditions are posing challenges for athletes, spectators, and organizers alike. Sport influences both culture and society, as well as the economy of individual countries through demonstrations and events (Olympics). This paper investigates into the multifaceted relationship between climate change and sports. It explores the various challenges and disruptions that climate change presents to the sports industry and how athletes, organizations, and fans are being forced to adapt. It goes into the intersection of climate change and sports, highlighting how it affects various aspects of the sporting world, from event scheduling and infrastructure design to athletes' health and performance. Moreover, it emphasizes the need for sustainable practices and adaptation strategies within the sports industry to mitigate the effects of climate change and promote climate-resilient sporting events.*

Keywords: *Climate Change; Sports Industry; Environmental Sustainability; Corporate Social Responsibility*

1. Introduction

Climate change has emerged as a pervasive global crisis, exerting profound and multidimensional effects across societal domains, including the sport sector. While the vulnerability of sport to environmental change has gained growing recognition, the precise dynamics of the climate–sport nexus and the full scope of its impacts remain insufficiently examined within scholarly discourse. Rising global temperatures, the increasing frequency and severity of extreme weather events, and the alteration of seasonal and geographic conditions are generating unprecedented challenges for athletes, spectators, and event organizers alike. These disruptions not only jeopardize the safety, performance, and operational feasibility of sporting activities, but also amplify the sector’s environmental foot

Sport is well-known as a powerful economic and social engine, playing a crucial role in shaping culture, society, and national economies. It constitutes a globally pervasive socio-economic catalyst, endowed with the capacity to attract, engage, and integrate heterogeneous populations irrespective of cultural, geographic, or socio-economic boundaries. Both amateur and elite-level sporting practices are widely recognized for their contributions to athletes' physical and psychological well-being, while simultaneously mobilizing diverse strata of spectators and stakeholders. Owing to its pronounced social capital and capacity for collective mobilization, sport emerges as a strategically significant vector for the generation of multidimensional societal benefits. In parallel, the discourse on sustainability has attained a position of centrality across numerous domains, including the sporting sector. Major events, from the Olympics to FIFA World Cups, serve as prime examples.

Large-scale sporting events, while generating substantial economic returns for host nations and associated industries, also entail significant environmental costs. The construction and operation of sport infrastructures — such as stadia, arenas, and training complexes — entail high energy demands and material throughput, resulting in considerable carbon emissions, depletion of natural resources, and the generation of waste. Nevertheless, sports organizations — constituting a mature and globalized industry — transcend the status of passive “resource consumers”; they possess a distinctive potential to serve as normative agents in the promotion and institutionalization of sustainable practices.

Yet, the sport industry, comparable to other major economic sectors, should not be viewed solely as a “resource consumer.” Owing to its global reach and cultural influence, it possesses considerable potential to act as a driver of sustainability by adopting environmentally responsible technologies, implementing socially inclusive policies, and engaging in targeted stakeholder education. Through the strategic deployment of environmentally sustainable technologies, the enactment of inclusive and equitable policy frameworks, and the cultivation of sustainability literacy among their diverse stakeholder constituencies, sport organizations can position themselves as archetypes of responsible governance.

Advanced technological paradigms — including Big Data analytics, the Internet of Things (IoT), Artificial Intelligence, and additive manufacturing (3D printing)— offer the capacity to enhance operational efficiency, reduce environmental footprints, and deliver measurable economic gains. When strategically deployed, these innovations not only improve the efficiency and sustainability of production processes but also accelerate the transition toward environmental conservation objectives. The systematic integration of sustainability imperatives into both quotidian operational frameworks and the design, management, and legacy planning of sporting events serves not only to attenuate ecological externalities, but also to augment institutional legitimacy, rein-

force community embeddedness, and consolidate reputational capital within the global sport ecosystem.

This reconceptualization of the sport–climate nexus aligns with a broader cultural transformation that has progressively reshaped evaluative criteria within the sporting domain: the legitimacy and societal value of a sports organization are no longer predicated exclusively on competitive achievements or economic performance, but increasingly on its capacity to produce a positive, durable, and transnational impact on its referent communities. Analogous to for-profit enterprises, sports organizations pursue profitability; however, the capacity to strategically allocate a portion of revenues to ethical, solidarity-based, and philanthropic initiatives constitutes a form of “sustainable” competitive advantage within an increasingly values-oriented market environment.

Within this context, Corporate Social Responsibility (CSR) functions as a pivotal governance mechanism capable of consolidating trust-based relationships among fans, athletes, organizational leadership, and the wider stakeholder ecosystem. When operationalized effectively, CSR enhances the stock of “social capital” — comprising reputational credibility, perceived reliability, and common embeddedness — that can be leveraged for both tangible and intangible returns¹. The resultant incentive structure generates measurable positive spillover effects, reinforcing the organisation’s legitimacy and stakeholder loyalty. This formulation frames CSR as a discretionary strategic choice whereby enterprises elect to contribute, on a voluntary basis, to the advancement of a more inclusive society and to the preservation of the natural environment.

CSR is thus reframed not merely as a moral imperative to which firms should adhere — whether in response to ethical imperatives or to the normative pressure of stakeholders (Bradish & Cronin, 2009) — but as a strategic opportunity to augment profitability, enhance brand equity, and facilitate resource mobilization for non-profit operations, as is frequently the case for amateur sports associations.

In the contemporary economy, corporate reputation is increasingly contingent on the adoption of socially and environmentally responsible behaviours, which simultaneously function as market differentiators and as drivers of consumer demand. In this sense, CSR defines and projects an organization’s mission and market identity. Strategies in this direction offer opportunities for all organizations. Rooted in the vision and values of top management, CSR is conceived not as a cost centre but as a managerial strategy for competitive differentiation,

1. To define the conceptual boundaries of CSR, reference is made to the extensive definition given by the European Commission (2001) as "a voluntary integration of social and environmental concerns by companies into their business activities and interactions with other stakeholders", in other words a choice through which companies voluntarily commit to contribute to a more inclusive society and to support environmental protection.

producing both direct and indirect benefits for diverse stakeholder categories (Beji et al., 2021).

In this sense, CSR plays a crucial role in sports enterprises, too — from professional clubs to equipment manufacturers — capable of deeply influencing and attracting lots of people worldwide.

As a global phenomenon, the sporting industry, given its universal reach and socio-cultural resonance, occupies a privileged position from which to influence attitudes, behaviors, and norms at scale. It has the opportunity and responsibility to disseminate positive values economically and socially via sustainable practices. Actors within this sector — from elite professional clubs to equipment manufacturers — possess both the capacity and the responsibility to advance dual economic and social objectives. The strategic promotion of ethical and environmental values through the implementation of sustainable practices — including renewable energy adoption, waste minimization, and the organization of low-impact events — aligns the industry with global sustainability frameworks, thereby reinforcing its normative legitimacy. For such organizations, CSR represents a high-value strategic lever, capable of generating positive externalities that underpin long-term economic viability and reputational resilience.

The promotion of ethical and environmental values helps in this sense: These organizations, for example, by adopting sustainable practices, such as the use of renewable energy, waste reduction, and the organization of low-impact events that minimize their ecological footprint, might contribute to global environmental sustainability goals. Acting in this way, sport enterprises have the great strategic opportunity to gain a positive external impact, ensuring economic and reputational sustainability in the long-run.

However, the operationalization of CSR within sport must be embedded in a broader systems perspective, wherein the viability and impact of campaigns are conditioned by the environmental contexts in which events occur. A philanthropic sporting initiative designed to promote a given competition, for instance, is more likely to achieve resonance and legitimacy if held under favourable climatic conditions that ensure the quality and integrity of the sporting performance. The sport–climate relationship is thus determinative in enabling the effective translation of ethical commitments into practice within the sector.

Nonetheless, the inherent contradictions of sport's environmental footprint remain salient. High energy demands associated with event staging, the production and distribution of merchandise, and the carbon intensity of team travel represent structural tensions that can undermine the credibility of sustainability-oriented initiatives. This paradox raises a fundamental question: how can an organization that generates substantial greenhouse gas emissions through its core activities credibly position and promote itself as a champion of environmental stewardship?

The present study therefore undertakes a critical examination of the sport–cli-

mate interface, interrogating the extent to which CSR can serve as an authentic — rather than performative — vehicle for the promotion of virtuous, sustainable, and ethically grounded initiatives within both amateur and professional sporting contexts. Section 2 analyses climate change and its multifaceted implications for the sporting sector. Section 3 provides a critical review of the extant literature on the sport–climate relationship and evaluates the strategic utility of CSR within sports organizations. Section 4 concludes with a series of normative considerations and policy-oriented recommendations.

2. Climate Change and its Multidimensional Impacts on Sport

Climate change can be identified through a spectrum of natural catastrophic events, including extreme heatwaves, droughts, and floods, as well as abrupt—often unexplained—shifts in seasonal average temperatures. It also manifests in rising sea levels, wildfires, and landslides, whose frequency and intensity have, over recent decades, increased both dramatically and anomalously². This definition encapsulates both the gradual and the abrupt transformations in climatic systems, encompassing persistent deviations from historical norms that may be driven by anthropogenic activity, natural variability, or complex interactions between the two). Emerging technologies—particularly digital infrastructures—are themselves characterized by high energy intensity, underscoring the imperative to ensure that digital development proceeds in tandem with environmental preservation, accelerating the transition towards “green” paradigms.

At the regulatory level, the European Climate Law (Regulation 2021/1119) establishes the target of achieving climate neutrality by 2050, with an interim target of a 55% reduction in greenhouse gas emissions by 2030 compared to 1990 levels. Recent analyses indicate that achieving the latter target alone will require investment in energy systems, transportation, and building infrastructure at twice the current levels (Institute for Climate Economics, 2024). Meeting these investment requirements cannot realistically rely solely on the public budgets of individual EU member states; a substantial mobilization of private sector resources is equally indispensable.

The adverse effects of climate variability can extend beyond environmental degradation to encompass human health—both physical and mental—and the integrity of ecosystems. In the sporting domain, they may directly affect the well-being of specific groups, notably athletes and spectators, manifesting, for example, in heightened sleep disturbances or increased physical fatigue associated with sudden temperature spikes. may impact citizens' health (both physical and mental), the entire ecosystems, and also the well-being of specific groups,

2. For the purposes of this study, climate change is understood in accordance with M.O. (2018) “a long-term shift in the planet’s weather patterns or average temperatures”.

such as athletes and fans, leading to critical issues like sleep disturbances or physical fatigue as a result of them.

The rapidity and scope of climatic transformations, as well as their multifactorial causes—whether anthropogenic or stemming from extreme natural events—underscore the salience of the interconnected concepts of vulnerability and emergency risk. In both scenarios, these constructs assume a central role in assessing and managing the systemic implications of climate change (Figure 1). The first concept (*vulnerability*), encompassing the capacity for reaction and recovery following a climatic perturbation, is broader in scope and lends itself analytical applications across diverse thematic areas, also very distant from each other, including sport. Climate change-related *risk*, by contrast, is of a more specific nature, predominantly situated within the analytical frameworks of forecasting sciences and economics. Both concepts are directly implicated in the exacerbation of soil erosion, depletion of organic matter, salinization, biodiversity loss, landslides, desertification, and flooding. The concept of vulnerability was initially investigated within the managerial sciences and only subsequently received targeted attention in sport-related contexts — for example, in the study of gender-based disparities among athletes, their physical and emotional vulnerability during performance, or financial fragility within sporting organizations. Climatic vulnerability, more specifically, is closely linked to the adaptive capacity of a given territory, reflecting its ability to confront the consequences of an unexpected and unpredictable climatic event, and its resilience in mitigating the associated damage.

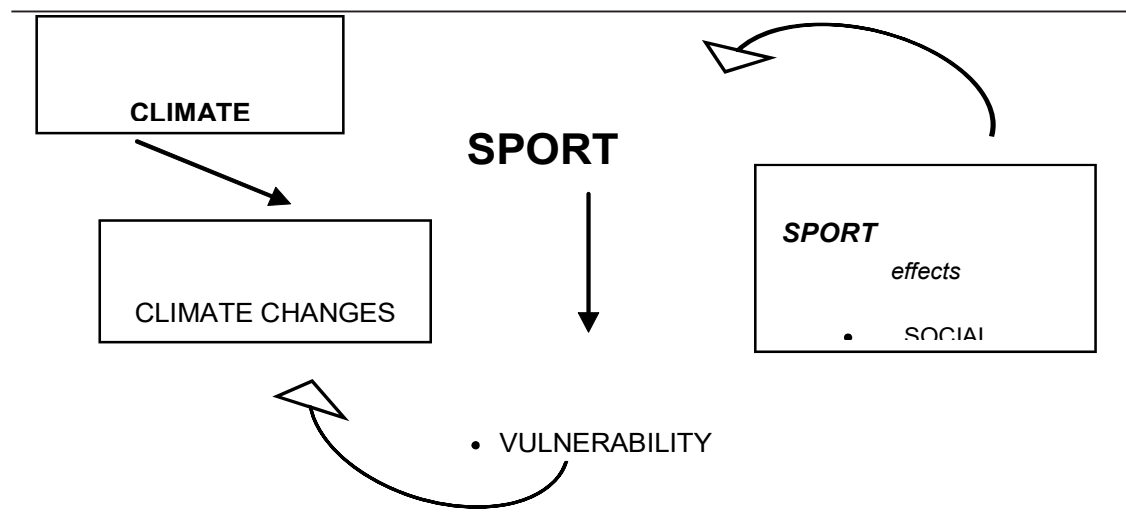


Figure 1 – The sport-climate relationship
Source: own elaboration

When applied to sports organizations, adaptive capacity refers to the ability to anticipate and manage the potential additional costs arising from climate change—ranging from investment in environmental technology and human resources to infrastructure adjustments. Indirect costs include intangible inputs,

such as the reputational damage incurred when an organization must contend with the negative impacts of unforeseen climatic events.

Variables intrinsic to sporting activity can themselves negatively affect environmental sustainability. These include the energy demands of transportation, the operation of sports facilities, and the power requirements of sporting venues—all of which contribute to increased greenhouse gas emissions³. Transport and energy systems remain heavily dependent on fossil fuels, a reliance that exacerbates climate change and disproportionately affects outdoor sports through phenomena such as accelerated water evaporation, elevated ambient and surface temperatures, rising sea levels, and diminished snowfall. Consequently, the execution of physical and sporting activities often entails substantial consumption of environmentally harmful resources, thereby intensifying greenhouse gas concentrations, amplifying both sea and perceived temperatures, and contributing to ecosystem degradation.

The sport–environment nexus has attracted the interest of scholars across multiple academic disciplines, including tourism (Scott et al., 2015), sports medicine (Nybo et al., 2020), and ecology (Grundstein et al., 2013). Nevertheless, empirical investigations into the bidirectional causal mechanisms between sport and climate remain comparatively limited (Dingle, 2020; Orr & Inoue, 2019). Malen et al. (2011), in a systematic review of 4,639 peer-reviewed articles published across 21 journals spanning sport sociology, sport tourism, sport marketing, and sport management, underscored the fragmented nature of this research domain.

Empirical evidence highlights the sport sector’s substantial carbon footprint. Pereira et al. (2019) estimated that, during the 2016–2017 season, carbon emissions attributable to each Premier League player — including associated medical and coaching staff — averaged approximately 29 metric tons, with air travel and luxury accommodation constituting the primary sources. Of these emissions, a portion persists in the atmosphere as the so-called *airborne fraction*, while the remainder is sequestered by terrestrial vegetation and marine systems. Similarly, Wicker (2019) calculated an average annual carbon footprint of 844 kg CO₂ per individual traveling for sport in Germany (n = 6,500), whereas Bunds et al. (2018) demonstrated that simple operational changes, such as carpooling for youth swimming teams, could reduce per-athlete-child emissions by nearly 40%.

3. Climate Change, Sport, and the Strategic Role of Corporate Social Responsibility. A Background Analysis

Sporting activities are conducted both indoors and outdoors, but especially for the latter, stability and favourable climatic conditions are a necessary pre-

3. For instance, an empirical study on the London 2012 Olympic Games estimated that approximately 55% of the total CO₂ emissions originated from transportation, encompassing travel by both participants and spectators (Cecon et al., 2024).

requisite. Therefore, any type of climate variation takes on a negative connotation. Climate change alters the landscape of outdoor sports, affecting the safety and feasibility of many disciplines. Rising temperatures and the frequency of extreme weather events, such as heat waves, heavy rains, and storms, pose new challenges for managing sports events and ensuring athlete safety.

Winter sports, in particular, are vulnerable to reduced snowfall and glacier retreat, threatening not only the regular occurrence but the very existence of many competitions. Recent studies indicate that ski resorts have already been adapting to this changed scenario by resorting to artificial snow, measures that, however, are unsustainable in the long term, both ecologically and economically (Orr et al., 2022). These measures not only increase operational costs but also place further environmental pressures through high water and energy consumption.

Empirical analyses have shown, for instance, that rising extreme heat poses risks to athletes' health, especially in endurance sports like cycling or marathons. Schneider and Mücke (2024) reported an increase in heat-related incidents during sports events organized under extreme climate conditions.

The role of climate in sports is therefore central, particularly because it often results from the interaction between humans and the environment. Sports activities are not exempt from responsibility in terms of carbon emissions. Large-scale events like the Olympic Games or the FIFA World Cup generate significant emissions from infrastructure construction, stadium lighting, and international travel. Although the sports industry has long taken steps to reduce or at least contain its environmental impact—such as implementing energy-efficient facilities, promoting sustainable transportation, and offsetting emissions through reforestation programs or renewable energy initiatives (Wilby et al., 2023)—much remains to be done.

Some scholars argue that a transition to sustainability is now urgent for the survival of sports activities themselves (Oreskes, 2018; Rogelj et al., 2018). Sports are a cultural hallmark of a nation, bringing together people of all ages and backgrounds, promoting competition through cooperation. Institutions, amateur sports associations, and citizens work to offer and share inclusive sports events.

It is in this context that environmental sustainability becomes a critical factor. Greater attention to and protection of the ecosystem enhances sports competition outcomes and increases the economic and social well-being generated. Managing sudden climate change requires both regulatory responses and the capacity for adaptation and intervention by sports organizations and related industries. This is why the sports sector is committed to mitigating climate effects and becoming more resilient.

The introduction of sustainability policies and climate strategies has become an integral part of the management strategies of sports enterprises. In recent years, the sustainable environmental placement of sports facilities has attracted growing attention, with sports organizations actively collaborating with envi-

ronmental groups to develop more sustainable practices. These include implementing green standards for infrastructure construction and reducing water and energy consumption (McCullough et al., 2020; Orr et al., 2022).

Fighting climate change in the sports context is not limited to reducing risks; it also offers opportunities to promote “environmental awareness.” Sports can serve as a powerful educational platform, raising awareness among millions of fans and participants on climate issues. Additionally, sustainability can enhance the reputation of sports organizations, strengthen bonds with fans, and attract environmentally conscious sponsorships (Orr et al., 2022).

Over the past few decades, accelerating climate change has transformed the environmental landscape, manifesting in a sustained degradation of ecosystems, resources, and biodiversity. This ongoing deterioration has heightened both academic and managerial interest in the intricate relationship between sport, climate change, and sustainability. On one hand, climate change disrupts the environmental and meteorological conditions under which sport is practiced, with implications ranging from athlete safety to event scheduling and infrastructure resilience. On the other, sport itself contributes to environmental impact through greenhouse gas emissions generated by large-scale events, energy-intensive infrastructure, and the extensive travel of athletes, officials, and spectators. For example, an empirical study on the London 2012 Olympic Games estimated that approximately 55% of total CO₂ emissions originated from transportation, encompassing participant and spectator travel (Ceccon et al., 2024).

Against this backdrop, Corporate Social Responsibility (CSR) emerges as a strategic tool for sports organizations to address both their environmental footprint and their broader societal impact (Anagnostopoulos, 2025). This dual dynamic explains why CSR — defined here as the ethical and responsible management of sporting activities, competitive and non-competitive alike, in alignment with sustainable development principles—offers a means of embedding ecological, social, and governance concerns directly into the core of sport management. Beyond mitigating environmental harm, well-structured CSR initiatives can foster positive stakeholder attitudes, stimulate supportive behaviors such as purchase intention, event attendance, and investment, enhance organizational image, and build resilient, long-term stakeholder relationships.

Breitbarth et al. (2015) emphasize the tangible benefits accrued by clubs implementing ethical, philanthropic, and sustainability-focused initiatives, highlighting gains in both financial performance and stakeholder goodwill⁴. The di-

4. The World Business Council for Sustainable Development (WBCSD, 2000) has long emphasized the strategic significance and multidimensional value of CSR, defining it as “the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families, as well as of the local community and society at large”.

rect effect of such CSR campaigns is in having the potential to improve social, economic, and environmental well-being for both campaign promoters of ethical action and their fan bases. Ethical sports marketing, particularly when supported by digital tools such as social media platforms, further deepens engagement, a stronger, more stable, and reciprocal sense of sporting identity, creating reciprocal and enduring bonds between organizations and their fan communities. Given the socio-cultural influence of sport, organizations — regardless of their profit orientation — carry an implicit obligation to pursue equity-driven and ethically sustainable objectives.

The conceptual foundations for structuring CSR in sport draw on Carroll's (1991) four-part model — philanthropic (what society desires), ethical (what society expects), legal (what society requires), and economic responsibilities —, the so-called CSR Pyramid later expanded by Hennigfeld et al. (2006), providing a hierarchical framework for organizational priorities, and emphasizing the need for equitable behavior that preserves the rights of all stakeholders within the global context in which sport operates. Broader models for assessing CSR initiatives, each designed to evaluate a specific dimension, such as Elkington's (1994) Triple Bottom Line, expand the evaluative lens by integrating social and environmental performance alongside economic metrics with the traditional corporate focus on profit generation⁵.

Measurement approaches, including Wood's (2010) Corporate Social Performance (CSP) index and the models proposed by Maignan (2001), Maignan and Ferrell (2002), and Singh et al. (2008) (EPIC), have been adapted for sport contexts, though each presents operational limitations. The CSP index (Wood, 2010) measures CSR's impact across stakeholder groups by capturing social responsiveness, although its reliability is limited by the variability of its constituent metrics. The EPIC model, with its focus on ethical, innovative, civic, and philanthropic responsibilities, offers strong psychometric robustness yet, like most approaches, measures perceived rather than actual CSR performance, unlike Turker's (2009) model and others. Employed across various contexts to measure consumer perceptions of CSR activities, it offers robust psychometric

5. This model, however, is not without criticism, as the measurement of non-financial outcomes remains inherently complex and highly subjective, thereby complicating meaningful comparisons of actual progress among firms within the same sector. These limitations are particularly evident in the sport industry, where the assessment of CSR initiatives — ranging from community engagement to environmental stewardship — often relies on qualitative indicators that lack standardization. In response, new methodologies and standardized frameworks have emerged to enhance the quantification of social and environmental impacts, most notably sustainability reporting practices aligned with the Global Reporting Initiative (GRI) standards. Applying such frameworks to sport organizations could improve the transparency, comparability, and credibility of their sustainability claims, facilitating more informed decision-making by stakeholders and policy-makers alike.

properties—including assessments of personality, emotional intelligence, and behavioural preferences—with high reliability and construct validity. Nonetheless, a key limitation, shared with other evaluation methods, is its tendency to measure perceptions of CSR activities rather than actual performance. Despite this, the EPIC model is useful for understanding how different CSR components influence consumer behaviors such as brand loyalty and purchase intentions. It adapts well to multiple economic sectors, including sport, and diverse cultural contexts, providing organizations with guidance to enhance their CSR strategies and better communicate their social and environmental commitments.

However, despite these benefits, this perception–performance gap increases the risk of greenwashing, whereby organizations — sports entities included — may promote selective or exaggerated sustainability claims primarily to enhance their public image rather than out of genuine environmental commitment, capitalizing on the increasing demand for environmentally friendly practices, without implementing substantive change. This risk is particularly acute given sport’s widespread popularity and communicative power. The sports sector, given its unparalleled communicative power and capacity to mobilize large, diverse audiences due to the deep-rooted connections across all population segments, possesses a high communicative power and strong aggregative capacity, making it particularly vulnerable to such risks.

Conversely, it holds significant potential to rapidly disseminate ethical, social, philanthropic, environmental, and sustainable values through the proper institutionalization of CSR practices. Large audiences can thus be quickly reached, and, through mechanisms of sports emulation, begin to adopt the values advocated by their favorite teams and/or athletes. These individuals, introduced into the virtuous cycle created by sports CSR, may adopt or reinforce more social, sustainable, and altruistic attitudes and behaviors, generating an “imitation effect” among much of the fan base. Consequently, the “sporting social capital” — both professional and amateur — becomes enriched with moral and sustainable values; clubs strengthen their reputations, and enhance simultaneously their credibility with potential investors, solidify external relations with supporters, and ensure more sustainable growth of the entire system. These positive behaviors would reflect on all stakeholders, fostering improved institutional relationships and conferring a clear competitive advantage to the sports organization that adopts them, through more solid fan loyalty, efficient competitive practices, and virtuous conduct.

From an ethical standpoint, the need remains to reconcile private corporate interests of sports organizations with the heterogeneous interests of their stakeholders (Coelho, 2003). The benefits of CSR in sport are tangible and accrue to consumer-fans, teams implementing ethical, equitable, philanthropic, and sustainable campaigns, as well as beneficiary organizations supported by fundraising activities (Babiak & Wolfe, 2006; Inoue & Kent, 2014; Ullah et al., 2021).

Sport-related CSR (Figure 2) refers to the voluntary integration of social, environmental, and ethical considerations into the strategic and operational framework of sports organizations, going beyond the requirements of legal compliance. Within the sport ecosystem, it encompasses a wide range of initiatives that leverage the sector’s unique social capital, cultural resonance, and mass appeal to promote community engagement, environmental stewardship, equity, and inclusion. From a managerial perspective, embedding CSR into sport operations entails incorporating sustainability metrics into event planning, supply chain management, athlete development programs, and stakeholder engagement strategies. Such integration can mitigate the environmental footprint of sports activities—through measures such as sustainable venue construction, renewable energy adoption, and low-carbon mobility—while enhancing the organization’s brand equity, stakeholder trust, and long-term financial viability.

In these contexts, trust emerges as the critical mediating variable. It is the common denominator among sports stakeholders: the higher the trust between fans and clubs, the greater the appeal, the more evident the positive effects triggered by ethical campaigns, and the higher the participation in sporting events and subsequent philanthropic and/or sustainable initiatives by supporters. As a result, such processes enhance club reputation, strengthen investor confidence, consolidate supporter relations, and promote systemic sustainable growth.

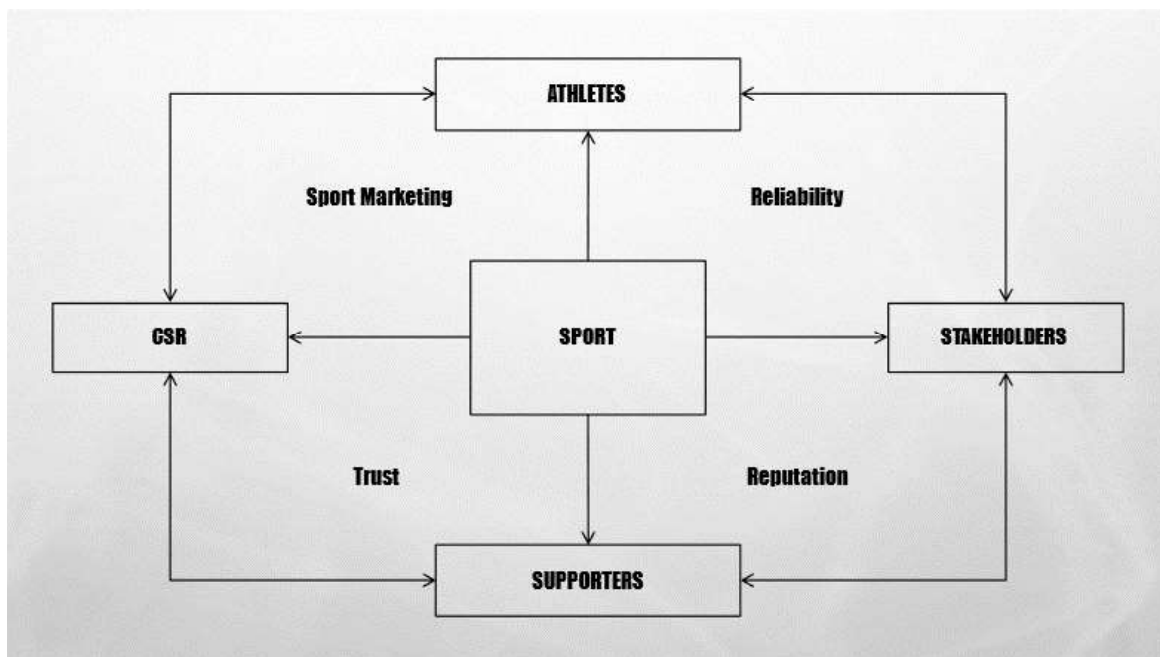


Figure 2 – The Sport-related Corporate Social Responsibility
 Source: own elaboration

In short, higher levels of fan–club trust increase the appeal and effectiveness of CSR campaigns, boost event participation, and generate greater engagement

in subsequent philanthropic or environmental initiatives. For sport managers, the implication is clear: CSR is not merely an adjunct to core operations but a strategic lever for competitive advantage, value co-creation, and long-term sustainability in a climate-challenged global environment. By aligning competitive performance with the United Nations Sustainable Development Goals, sports entities can act as catalysts for systemic change, fostering the long-term resilience of both the communities they serve and the natural environments upon which their activities depend.

Institutional examples illustrate this trajectory since leading governing bodies have increasingly institutionalized CSR. In 2005, the Fédération Internationale de Football Association (FIFA), for instance, established a dedicated CSR department and launched the *Football for Hope Movement* in partnership with Streetfootballworld, a network of more than 100 community-based organizations worldwide, sharing the common goal of using football as a vehicle for socially sustainable development. Similarly, the International Olympic Committee (IOC) embeds sustainability into its bidding and hosting requirements, promoting legacy planning and environmental accountability for mega-events. Professional leagues such as the NBA and Premier League have implemented CSR programs addressing issues from youth education and gender equity to carbon neutrality. Such initiatives demonstrate the capacity of sport to serve as a catalyst for societal progress when CSR is embedded as a core strategic pillar rather than a peripheral activity.

Building on the previously discussed challenges in assessing CSR performance, the mechanism depicted in Figure 2 positions sport as a catalytic element, a central integrator connecting for all stakeholders involved — athletes, fans, and other relevant actors — whereby the implementation of CSR initiatives (ethical, sustainable, and philanthropic) serves to enhance the “sporting reputational capital” of the promoting organization. Athlete involvement as ambassadors and endorsers within ethical campaigns (sport marketing) further serves as a credible reputational signal, amplifying perceived authenticity and reinforcing stakeholder confidence.

Nevertheless, a persistent challenge remains: defining and quantifying an “optimal” sport-specific CSR profile capable of guiding precisely investment decisions in socio-sport programs. Addressing this gap requires a more systematic approach, such as the development of a socio-economic mapping of the local territory, which would enable sports organizations to identify with greater accuracy both the sponsorship market and the composition of their fan base. This evidence-based targeting could, in turn, facilitate the design of campaigns that not only meet ethical and social objectives but also integrate environmental responsibility — thereby aligning local community engagement with broader sustainability imperatives. In this sense, sport’s distinctive communicative power and aggregative capacity can be leveraged to create enduring,

mutually reinforcing relationships between the sports entity, its environment, and its stakeholders.

4. Conclusions and Policy Sustainability Implications

The intersection of sport and climate change is no longer an abstract or emerging concern—it is an urgent, measurable reality. Empirical evidence, though still limited in scope, demonstrates that sporting activities both influence and are influenced by environmental change, with effects spanning infrastructure resilience, athlete performance, spectator engagement, and the ecological footprint of event logistics. The bidirectional nature of this relationship demands a reframing of sport not merely as a passive recipient of climate risks, but as an active agent capable of driving sustainability transitions.

From a policy perspective, the implications are clear. Climate resilience must be embedded within the governance frameworks of sport organizations, integrating environmental risk assessment into long-term strategic planning. This requires coordinated action among athletes, event organizers, sponsors, policy-makers, and local communities to operationalize adaptation and mitigation measures. Incentivizing low-carbon transport, energy-efficient infrastructure, and circular economy models in sporting operations should become baseline industry standards.

Financial mechanisms—such as targeted green funds, climate-linked sponsorship agreements, and tax incentives for sustainable infrastructure—can accelerate the sport sector’s transition toward net-zero emissions. Regulatory alignment with recognized sustainability reporting frameworks, such as the Global Reporting Initiative (GRI) or the UN’s Sustainable Development Goals (SDGs), would also strengthen accountability and comparability across organizations and events.

Finally, given sport’s unparalleled cultural reach and its ability to influence behavioral norms, the sector holds a unique position to shape public attitudes toward environmental stewardship. Well-designed CSR strategies in sport should therefore extend beyond symbolic commitments, embedding principles of equity, inclusion, and ecological responsibility into everyday operations. By doing so, sport can function simultaneously as a competitive arena, a catalyst for community well-being, and a powerful platform for advancing global sustainability objectives.

Sporting events—and sport more broadly—transcend linguistic, cultural, and technical boundaries, functioning as a powerful social tool across cultures. This unique unifying capacity underscores the urgency of advancing a rigorous evidence base on sport-related sustainability, with the aim of mapping potential pathways toward a more environmentally and socially resilient sport ecosystem. Beyond its economic and entertainment value, sport contributes substantially to

socio-emotional well-being, delivering significant cognitive, physical, and community benefits across all demographic groups.

Historically, sport has been deeply intertwined with specific geographic and cultural contexts (e.g., skiing in Scandinavia, golf in Scotland). The sport–environment nexus is inherently bidirectional: environmental conditions dictate the viability and form of sport, while sport activities exert measurable pressures on the environment. Greenhouse gas emissions arise from multiple sources, including the operation and maintenance of sport facilities, athlete training and mobility, spectator travel, and associated production chains. The environmental footprint scales proportionally with event magnitude.

At the same time, sport plays a key role in fostering social interaction, personal development, and social mobility, offering individuals purpose, discipline, and a sense of belonging and community integration. This dual role explains sport’s explicit inclusion in the United Nations 2030 Agenda for Sustainable Development, as well as in Italy’s National Recovery and Resilience Plan (PNRR 2021–2026). While the PNRR allocates a relatively modest allocation of €700 million, these funds target energy-efficient retrofitting of existing infrastructure and the construction of new sport facilities aligned with green transition and digital transformation objectives.

Addressing climate challenges in sport requires a coordinated, multi-stakeholder approach encompassing athletes, event organizers, policy-makers, and fans. The sport sector holds considerable latent potential both to reduce its own environmental footprint and to act as a cultural driver for broader societal transitions toward sustainability. Given the global scale of sport and the substantial economic impact of mega-events such as the Olympic Games, the sector’s dependence on climatic stability warrants sustained analytical scrutiny. Climate change — predominantly anthropogenic in origin — poses operational risks that may require tailored adaptation measures, making the integration of climate-crisis scenarios into sport event management a critical research and policy priority.

Moreover, enhanced access to targeted financial mechanisms — explicitly linking sport and climate priorities — could accelerate the sector’s environmental transition toward greater sustainability. CSR serves as a pivotal lever in this process. While it should be embedded within the strategic management of all organizations, its adoption in sport is particularly compelling given the sector’s unparalleled capacity to influence public behavior and societal norms. Principles such as equity, inclusion, environmental stewardship, and philanthropy—central to CSR—should constitute the baseline operational ethos of both professional and grassroots sport organizations.

The relationship between sport and climate remains dynamic and complex. On the one hand, climate change introduces new constraints and risks for sport activities; on the other, sport continues to exert measurable environmental im-

pacts. Adaptation and mitigation strategies can help to moderate these bidirectional effects, while simultaneously leveraging sport as a platform for advancing global sustainability objectives. Well-designed interventions—such as the ecological regeneration of urban spaces—can yield both environmental benefits and measurable reductions in social degradation, amplifying sport’s potential as both a beneficiary of, and a catalyst for, sustainable development.

In sum, the intersection of climate change, sport, and CSR presents a dual imperative: to mitigate the sector’s environmental footprint while leveraging its unique cultural and communicative reach to promote sustainability values. The literature underscores both the strategic necessity and reputational potential of embedding CSR into the governance structures of sports organizations. However, operationalizing such commitments requires moving beyond aspirational rhetoric toward measurable, evidence-based interventions. This calls for rigorous empirical inquiry capable of capturing not only stakeholder perceptions but also the tangible social, environmental, and economic outcomes of CSR initiatives in sport. The present paper addresses this need by presenting an analytical framework and reporting empirical findings designed to evaluate the efficacy and strategic value of CSR programs within contemporary sport management.

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