

Life Cycle Assessment (LCA) of a professional football match and the relevance of food & beverage impacts

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Considering the uniqueness with which football influences everyday life, the emotions of people or the radical bond, historical and cultural value in force between the clubs and the territories to which they belong, it is not surprising that corporate social responsibility has forcefully become part of the daily life of football clubs. The role that football plays in the community, and the importance for the football industry to be present in this area, have led to the exploration of different horizons that lead football to have an increasingly important role on a social level. In fact, as for all the corporate organisations, even for football clubs, it is becoming increasingly essential to set the cornerstones of their work, distinguishing their reasons for being, the pillars of the club's belief, the objectives to be achieved and the responsibilities to be faced.

As proved by Godfrey (2009), "*Corporate Social Responsibility (CSR) may be good for sport and sport organizations and sport may be good for CSR*". In fact, participation by sport organizations in CSR and related activities contributes to broaden CSR concept and increase its legitimacy in the society. Sport, thanks to its highly visible, well-regarded and well-known set of social actors, would foster a new management approach for private-sector companies which, most of the times, are not interested in contributing to create and sustain a higher quality of life in the society. Moreover, as suggested by Levermore (2010), the employment of CSR in sport organisations has allowed for development initiatives to extend to communities where traditional development schemes tend not to reach, especially youth communities.

While football world is very active in some aspects of sustainability like racism, social equity, and accessibility. However, if we analyse environmental sustainability, we can observe how football key actors (i.e., football clubs, stadium owners, National Football Associations) often do not have adopted or implemented advanced initiatives. The football industry can play a key role in shaping and influencing all the federated football organizations: if they start showing a proactive approach towards environmental governance and management, there is a change that also the other sport organisations and fans will follow their good example thanks its capacity to achieve people of different income, ages, included disadvantaged and vulnerable social groups. Football can thus become a key sector to work on for engaging people and organisations in joint efforts towards behavioural change in environment protection especially with the involvement of young generations of athletes and supporters.

Football industry is in a laggard position on environmental sustainability considering also what has happened in the last 20 years in this field. However, in the last years we can observe a new wave of interest by sport and football organisations on environmental sustainability. So for instance, the European Governing Body of Football (UEFA) announced a year ago that it will plant 600,000 trees across the 12 host countries of EURO 2020 along with other initiatives aimed at offsetting the carbon emissions caused by fans travelling and during the matches themselves. Recently UEFA announced its support for the European Climate Pact, pledging to use football's global reach to raise awareness of the climate emergency and inspire more people to take action to save the planet. More recently, UEFA unveils sustainability strategy focusing on human rights and the environment. UEFA has announced the launch of its innovative Football Sustainability Strategy 2030 – 'Strength through Unity', a long-term commitment by UEFA where topics such as circular economy and sustainable infrastructure are targeted for the future football matches.

Despite this interest in the "practitioners" world, the academic world is not contributing particularly to the debate. Only few articles have been published in the field of sport environmental management and a very limited number of articles have been published on environmental management in football (Daddi et al., 2021). No article have shown the result of an application of LCA to assess the environmental impact of a football match with a life cycle perspective.

In this framework our paper aims to bridge this gap discussing the result of an LCA carried out on a football match played by Real Betis Balompié, a professional football team of the Spanish Liga. We, together with the environmental manager of the club, have carried out an extensive collection of environmental data referred to the football season 2018/2019 (to avoid covid impacts on the LCA results).

The results, elaborated by using ISO14040 requirements, show relevant impacts derived from 1 match used as functional unit such as: 75,159 of kg CO₂ eq for the climate change impact category or 66,340 m³ depriv. as water footprint. In the next table the results of the LCA are resumed.

| <i>Impact category</i> | <i>Unit</i> | <i>Total</i> |
|-------------------------------------------------|------------------------|--------------|
| <i>Climate change</i> | kg CO ₂ eq | 75,159.79 |
| <i>Ozone depletion</i> | kg CFC11 eq | 0.009 |
| <i>Ionising radiation, HH</i> | kBq U-235 eq | 20,356.21 |
| <i>Photochemical ozone formation, HH</i> | kg NMVOC eq | 325.97 |
| <i>Respiratory inorganics</i> | disease inc. | 0.0017 |
| <i>Non-cancer human health effects</i> | CTUh | 0.010 |
| <i>Cancer human health effects</i> | CTUh | 0.0003 |
| <i>Acidification terrestrial and freshwater</i> | mol H ⁺ eq | 497.86 |
| <i>Eutrophication freshwater</i> | kg P eq | 14.64 |
| <i>Eutrophication marine</i> | kg N eq | 142.50 |
| <i>Eutrophication terrestrial</i> | mol N eq | 1384.70 |
| <i>Ecotoxicity freshwater</i> | CTUe | 42,620.32 |
| <i>Land use</i> | Pt | 1,424,917.64 |
| <i>Water scarcity</i> | m ³ depriv. | 66,340.18 |
| <i>Resource use, energy carriers</i> | MJ | 1,239,209.35 |
| <i>Resource use, mineral and metals</i> | kg Sb eq | 0.019 |

Table 1 Average LCA results for a football match played by Real Betis Balompié in the Season 2018/2019

A further elaboration of results shows in table 1 demonstrates that considering the overall environmental footprint derived by the LCA study, the main contributors are 3 sources: mobility, energy consumption and food and beverages. In specific food & beverage activities contribute for around 13% of the total environmental impact. And focusing on this kind of activity carried out in the stadium during a football match, the results show how the most relevance impact is linked with food & beverages (included packaging) consumed in the VIP area i.e. where the club provide catering services to the supporters.

The paper will also discuss what actions can put in place by the football clubs to face the environmental impacts of a football match and what are the future research avenues to be pursued by scholars to further contribute to the knowledge in the field of environmental management and professional football.