

Innovation and Sustainability in Hungarian Football Clubs: Literature Insights and Case Study Evidence

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Abstract: - The research consists of two methodological steps. In the first step, we conducted a systematic literature review, and after an interview with the managers of four Hungarian football clubs was conducted. The focus of our research was on identifying sustainability priorities and implemented measures, as well as identifying existing challenges and development opportunities. Implementing sustainable practices and innovations in the football sector can bring significant benefits to football clubs. In our research, sustainable innovation is viewed in terms of improved organisational performance, higher levels of motivation among coaches and athletes, and greater cooperation with all stakeholders. Furthermore, the combination and integration of sustainability and innovation, combining logics and concepts for football clubs. This article reports on empirical research based on a limited number of cases, yet it aims to provide some preliminary insights into the current Hungarian football scene and to inspire future research.

Key-Words: - football, green innovation, innovation, management, organisational performance, sport, sport management, sustainability.

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1 Introduction

Innovation and sustainability have gained increasing attention in sports management research and practice. Sports can no longer be viewed as entertainment or athletic performance but as major economic and social organisations with a wide-ranging environmental impact. Football is unique among sports due to its role in the global industry and local culture. Football is part of the Hungarian national identity, it's in our communities, and it's a business too. There are a lot of stakeholders involved, like the ones in charge, local governments, fans, companies that support teams, staff, and the players themselves. All these people working together create a complex system that can be good for trying new and innovative things and being sustainable, but it's also difficult to make changes happen. From a stakeholder theory perspective, sport can serve as a platform for cooperation to advance social responsibility by combining financial resources and social influence to create value for numerous stakeholders and the environment [1]. New technologies, practices, and business models that improve the efficiency and competitiveness of a club are defined as innovation in sport management. Within this context, sport-based entrepreneurship highlights innovation, proactivity, and risk-taking as

core mechanisms driving value creation in the sport sector [2]. Sports organizations are increasingly engaging with environmental issues, although these efforts are not driven solely by ecological considerations. In many cases, sustainability initiatives are also linked to economic interests and long-term strategic positioning. Decision-making processes are not limited to the clubs themselves because stakeholders also play a meaningful role in shaping priorities and actions. At the same time, clubs want to appear good not only to their sponsors but also to their fans. This can help them save money too [3]. Sustainability and innovation are often treated as separate concepts, which is a wrong attitude. In practice, to be sustainable, frequently needs innovation and the other way round. In the context of sport, more particularly in football, innovation includes innovative technologies, such as analytics or wearable devices during training and match days, and it also involves the rethinking of existing organisational practices and the development of new approaches that create value for a broader range of stakeholders. Sport innovation is a very complex phenomenon, which includes organisational innovations, training methodologies, governance structures, and community engagement programs. In football, long-

term innovation and sustainability cannot be achieved by individual actions from single clubs; system-wide reforms are needed both at the governmental level and in financial regulation [4].

In the context of football, innovation is not just about the development and use of new technologies. It tends to involve a variety of areas, such as product development, training improvement, organisational culture, and marketing. In practice, this means that clubs start using new analytics, improving the performance of their players, or trying out new training methods. At the same time, football clubs must also concentrate on making their stadiums more sustainable. Some of the clubs dedicate special roles or specific units within their organisation that are responsible for sustainable stadium development and operation (e.g.: renewable energy use, water saving system; waste reduction etc.) or fan engagement. Other things, like measuring innovation in football is also very important and might be challenging, while traditional ways that only measure financial savings or spending on technology development are not sustainable. Innovation in football clubs is more complex, innovation might appear in new programs for youths, training methods, or inclusiveness of fans. To really understand innovation in football, we must understand it in a complex manner. If we realise this complexity, it can help us to see what kind of innovation drives sustainable change both for the club and the community. Football played always a very important part in Hungarian culture and history, which makes the country a good example for studying innovation and sustainability within this area. However, clubs still struggle with financial stability and keeping their fans engaged [5]. This is why studying innovation in Hungarian football is so important. Trendafilova, S., et al. (2013) also show that corporate social responsibility and the media can help spread environmental practices among sport organisations, encourage sustainable innovation, and reduce costs [6]. Other research evidence reveals that entrepreneurship, innovation, and creativity are recognised as key drivers of change, value creation, and employment in sport management [7]. Although only a relatively small number of studies examine the connection between sustainability and innovation in football management, even fewer examine this topic in the Central and Eastern European context. This gap provided the rationale for the present study. In reflection of the ongoing research on sustainability and innovation, it is important to clarify the positioning of the present study. The primary objective of this study is threefold: (1) to formulate

a systematic literature review, which synthesize theoretical and empirical insights on innovation and sustainability in sports management in more particular in football; (2) to provide an empirical research through management interviews with four Hungarian football clubs in order to examine qualitative validation; and (3) to develop a conceptual roadmap for sustainable organizational performance. This study is not designed as a quantitative cost-benefit analysis, nor is it an investigation into mathematical modelling; it seeks to adopt a qualitative and conceptual approach, with the aim of developing an analytical understanding and a theory-informed framework. This study looks at how Hungarian football clubs value sustainability and innovation, and if it helps them perform better and be more valuable to their community. It wants to answer some key questions, like how these clubs put sustainability and innovation into practice, and if it really makes a difference. The research draws on insights from a systematic literature review, completed by empirical real-life examples. In our observations, we relied more on qualitative information provided by the managers of the Hungarian football clubs rather than solely on statistics. This helped us better understand how sustainability and innovation are applied in practice. After examining the approaches adopted by the Hungarian football clubs, and analysing the insights, it might help to strengthen the innovation and sustainability performance of other clubs and their relationship with their communities as well.

The research questions of the study are as follows:

- How can Hungarian football clubs integrate sustainability and innovation into their strategy planning and decision-making?
- How can Hungarian football clubs add sustainability and innovation to their operation?
- What kind of benefits and challenges does club management recognise concerning these initiatives?
- What kind of sustainability and innovation initiatives and actions can be considered as drivers of long-term competitiveness and resilience in football clubs?

2 Methods

The research implements a two-step methodology. As a first step, the research began by a systematic literature review to look at what's already been written about innovation and sustainability in sports management. This was done to get a sense of what we already know about the topic. Then, as a second step, semi-structured interviews has been prepared,

and management representatives have been asked at four football clubs in Hungary to get their thoughts and experiences. This approach gave us a detailed understanding of what these managers think and how they're handling challenges, rather than just looking at numbers. This qualitative survey helps us understand the complexities of the Hungarian football sector in a more appropriate way.

2.1 Systematic Literature Review

To understand innovation and green management in Hungarian football, it was necessary to identify the key drivers, practices, and outcomes of these complex phenomena that shape this field. Our study draws on a structured search of major academic databases including Scopus, Web of Science, and Google Scholar. The search process contained key words such as “innovation”, “sustainability”, “sport management”, “green innovation” and “football club”. Attention was given to the literature of the last fifteen years (2015-2025). Following an initial screening of 112 documents, a total of 41 studies and reports has been selected that were the most relevant to our research. To maintain consistency with international methods, the analysis also relies on guidelines and frameworks created by organizations like the OECD, Eurostat, and the European Commission, including the Oslo Manual [8] and the Frascati Manual [9]. The selected literature was examined across four main areas: drivers of innovation related to organizations and management, sport-specific innovation and technology use, sustainability and green innovation, and measurement frameworks with their economic impacts. This organized approach allowed for an exploration of how these areas interact within the context of Hungarian football clubs. The selected literature was analysed across four main areas: organizational and managerial factors that drive innovation, sport-specific innovation and technology use, sustainability and green innovation, and measurement frameworks along with their economic effects. This structured method allowed us to investigate how these areas connect within Hungarian football clubs. The systematic literature review provides a deeper understanding of the complexities surrounding sustainability and innovation in football. It identifies gaps in research and suggests areas for further development. Overall, the analysis aims to improve knowledge in the field and promote sustainable, innovation-focused practices. This could benefit both the sport and its broader environmental impact.

2.1.1 Innovation Policy and Strategic Frameworks of Europe

The European Union has focused more on improving its scientific and technological abilities from 2020 to 2024. This plan, called the EU Innovation Strategic Plan, aims to make Europe a leader in innovation. It also seeks to turn significant challenges into opportunities and enhance technological capacity during this period. The plan is closely aligned with the main priorities' goals of the von der Leyen Commission, including the European Green Deal and moving forward in the digital age. Both goals rely on innovation to make Europe more sustainable and competitive [10]. Studies have shown that countries in the EU that take care of their citizens' welfare, like Nordic countries, are better at doing research, creating new knowledge, and using new technology. They are the ones leading the way in innovation [11].

2.1.2 Organisational and Managerial Drivers of Innovation

According to the literature, it can be stated that organisational culture, managerial knowledge, and leadership play a crucial role in innovation. Some of the literature highlighted the importance of knowledge management activities, such as knowledge creation and integration, which also positively affect innovation speed, quality, and output [12]. An empirical research study examined sport organisations and demonstrated that leadership style has a significant effect on organisational culture and organisational performance, and highlighted the importance of managerial alignment, internal cohesion, and strategic clarity in achieving sustainable results [13]. At the same time, CEO succession planning may negatively impact firm innovation and overall value [14]. External knowledge sharing also plays a crucial role in innovation: while on the one hand it may enhance innovation performance, on the other hand it may lead to unexpected knowledge leakage and harm organisational outcomes [15]. Organisational practices such as strategic planning, management engagement, and employee equality are also crucial to sustaining innovation performance [16]. Finally, it was found in the literature that collaboration and engagement with innovative communities are also recognised as a catalyst for knowledge creation and exchange of ideas [17].

2.1.3 Innovation in the Sports Sector

Innovation in sports clubs has technological, managerial, and organisational dimensions. Social capital and inter-organisational citizenship

behaviour accelerate innovation by facilitating knowledge sharing and collaboration [18], [19]. The adaptation of new technologies and the development of training methods improve sports teams' performance. Tools such as GPS tracking, wearable devices, and personal analysis software allow for more precise monitoring of the athletes and support the decision-making processes of the coaches [20], [21], [22], [23]. Those organisations that use these new technologies and training methods can gain competitive advantages.

2.1.4 Sports Innovation and Global Economics

Sport sector contributes to GDP and local economic development via investments in infrastructure, such as station buildings and related services [24], [25]. Major sporting events, such as the World Cup and European Championship can generate significant economic value and often lead to the development of new infrastructure in the hosting city [26]. These developments may benefit the local community and tourism industry. At the same time, professional sports teams make money from various sources, such as ticket sales, merchandise, and sponsorship deals. In addition to their economic impact, they can also contribute to urban development and engage with local communities in several ways.

2.1.5 Green and Sustainable Innovation

Sustainability and innovation are closely linked in organizations. Adopting environmentally friendly management practices and developing new technologies can lead to better sustainability performance [27], [28]. Green innovation is often described as the development of eco-friendly products, sustainable processes or projects that strengthen the company while supporting environmental goals [29]. Achieving sustainable innovation, requires management commitment for sustainable development strategies and practices, knowledge sharing, and an organisational culture that prioritises sustainability [29], [30]. At the same time, green and sustainable innovation also includes water conservation and the use of smart lighting systems. These new ideas don't just help the environment; they also make the stadiums run more smoothly and make them more enjoyable places for the community [31], [32], [33]. In the sports sector digitalisation has a strategic importance, on one hand, digital platforms enhance competitiveness, and on the other hand they help to engage stakeholders. Literature results show that technological adoption and digital interaction significantly influence consumer behaviour and economic performance within the sports industry

[34]. These findings are particularly important for football clubs, especially if we think about digital fan engagement tools, data-driven decision-making systems, and green innovation-based business models.

2.1.6 Measuring Innovation

The Oslo Manual and the Frascati Manual provide a common framework for analysing and measuring innovation-related activities. These manuals give us a way to consistently track and compare innovation across different countries and industries.

Some classic economic theories, including Schumpeter's concept of creative destruction [35], [36] and Drucker's view of innovation as the core tool of entrepreneurship [37], we can see that innovation has always been important. For example, Schumpeter concept of "creative destruction," demonstrates, when new ideas replace old ones that leads to growth. According to Drucker's idea, innovation is a key tool for entrepreneurs for success. Furthermore, Christensen's theory, called "disruptive innovation," shows how new technologies can challenge existing businesses and force them to change for better performance [38]. Measuring innovation is important for creating effective policy. It also allows for comparing performance across countries and sectors.

2.1.7 Football-Specific Examples

From time to time, more football clubs adopt new and sustainable practices in their strategies. Forest Green Rovers is frequently cited as one of the top examples. The club achieved carbon neutrality in 2018 as part of the United Nation's Climate Neutral Now initiative. This effort involved using renewable energy, conserving water, reducing waste, and promoting eco-friendly products and services. The club has also introduced plant-based catering and encourages more sustainable transportation options for supporters [39]. This shows that football and being green can go hand in hand, and it's not just good for the environment, but also brings financial benefits.

2.1.8 Synthesis and Research Gap

Sustainable organisational performance is very much dependent on innovation, knowledge management, and technology adaptation. In the sports industry, particularly in football clubs in Hungary, there's a lot of room for improvement. However not so many researchers have raised attention to this subject. This article is a turning point, it highlights the current state of the Hungarian football clubs on the field of sustainable innovation,

and shows how they can become more competitive, sustainable and improve their communities.

2.2 Management Interviews

Semi-structured management interviews were investigated in four Hungarian football clubs (ETO FC Győr, Gyirmót FC, Mosonmagyaróvári TE, and Üstökös FC) focusing on the clubs' attitudes toward green innovation and sustainable organisational performance. The selection of the four football clubs was conscious, we were choosing the clubs with different organisational size, with dissimilar competitive levels, financial capacity, and strategic orientation. Our aim was not to approve statistical representativeness but an analytical overview, allowing us to explore how sustainability and innovation are integrated under different structural conditions. The objective was also to examine how club management approaches sustainability, environmental responsibility, and long-term strategic planning in the football sector (Table 1, Appendix).

Table 1 (Appendix) presents the main characteristics of the football clubs. Information is based on publicly available club data and empirical evidence collected during management interviews.

Győr, which is located near the Austrian border, has a long football history. There are several football clubs based in the city, perhaps the most famous is the ETO FC Győr, founded in 1904. The club has spent many years competing at the highest level of Hungarian football and was recently the championship winners for the fourth time. On other occasions, the club has earned two silver and six bronze medals, and as rural teams go, this makes them the second most successful in Hungary. However, the recent history of ETO FC Győr was clearly marred by the bankruptcy of the former owner of the club, the Questor Group, in 2015. It was thanks to the support of the ETO Futsal team and the city of Győr that the club could continue operating, eventually working its way from the third division, through the second level of football to get promoted back to the top flight at the end of the 2024 season finishing the championship as the silver medallist, thus the team will start playing in the 2024/2025 season. The second most famous sports club in Győr is Gyirmót FC Győr, which is in Gyirmót district, and it plays in the 1st division of the second level but was also in the 1st division. So, it is a professional club. Other team in this city is Üstökös FC based in the Bácsa district, focused on youth development for 5-19 years old thinkers and footballers. It is a partner of Bácsa FC SE, which also runs senior football competitions for the

groups. The club, Mosonmagyaróvári TE, is based in Mosonmagyaróvár. It was founded in 1904. Until the last season, when they got relegated, they played in the second division. This year, they will start the 2024/2025 season in the third division. Despite the relegation, they continue to work hard to train young talents and compete at the highest possible level. Management of football clubs has placed great value on the environmental impact of stadiums and operations in recent years. In the last decade, there have been several investments that have made the lives of clubs easier. Club management is committed to sustainability in the long term and seeks to implement a 'green' solution in daily operations. By studying these phenomena, possible management strategies for maximising environmental performance and promoting 'green innovation' can be revealed within professional and semi-professional football clubs.

3 Results

This chapter shows, how ETO FC Győr, Gyirmót FC, Mosonmagyaróvári TE, and Üstökös FC - are working to reduce their environmental footprint. Interviews with both bodies and representatives from management of every club displayed their stance on sustainability and how they are implementing practices into the everyday working business. Three aspects were identified from the interviews with football clubs' managers i.e.; green infrastructure, sustainability practice, and strategic innovation. Also, we are interested if clubs are aware of international sustainability frameworks and whether they have significance for applying tips like the UN Sustainable Development Goals and the European Green Deal. We also inquired whether they incorporated these goals into their decision. Do their initiatives promote sustainability? We were interested in whether the clubs take these objectives into account when making decisions and whether the actions they implement contribute to sustainability. An additional asset investigated the influence of leaders' attitudes, as well as the innovation potential of sport organisations, on the implementation of 'green practices' and on achieving sustainable performance. This focus is on football associations and clubs. In addition to the innovative ideas shared during the discussion, it also highlighted that clubs are already implementing various practices across facilities and personnel, as well as training and staff management. Examining these different areas would reveal new opportunities for football clubs to become more sustainable and better performers. In our qualitative analyses, we

found that management plays an important role in driving sustainability initiatives and for achieving sustainable organisational performance, innovation is a must. It's exciting to think about the potential for football clubs to be a driving force for sustainability, and our study shows that by embracing green infrastructure and sustainable practices, these clubs can reduce their environmental impact while also enhancing their performance and contributing to a more sustainable future. It can also be read about the views of management on the role of different stakeholders, local governments, sponsors, sportsmen, and fans in supporting and financing sustainability and innovation. Our interviews were used to develop a sustainable organisational roadmap for Hungarian football clubs, outlining the steps clubs can follow to achieve sustainability and summarising current practices, opportunities, and challenges for football managers (Figure 1).

3.1 Management Interview

3.1.1 Adoption of Green Infrastructure and Practices

We examined the implementation of green innovations by Hungarian football clubs through management interviews. All interviewed club managers stated that they are working on the club's sustainability strategy, but the type and magnitude of the measures applied showed significant differences. "Our main goal is to increase energy efficiency, to use energy-saving lighting systems, and partly to cover our energy needs from solar panels," said the manager of ETO FC Győr. Water-saving solutions have also been incorporated into the operation of the stadium and pitch. Of the other clubs, Gyirmót FC Győr and Üstökös FC are currently developing their sustainability strategies. They also use solar panels for energy supply and, among other things, implement a selective waste collection program. They are also striving for a green transition in the operation of their facilities. In the case of Mosonmagyaróvár TE, sustainability measures appear less frequently, which can be partly explained by the lower budget and partly by the more moderate commitment to environmental initiatives (Table 2, Appendix).

3.1.2 Management Commitment and Strategic Orientation

The management interviews suggest that the attitude and commitment of leaders are important for the successful implementation of sustainability initiatives. Clubs with higher senior management

commitment to environmental issues have more well-defined strategic objectives that are consistent with sustainability practices. Not only do sustainability goals and practices help improve environmental performance, but they also save clubs money. The perception of a sustainable approach and practice is also more positive among society. Also, the managers highlighted that cooperation throughout the organization and employee involvement are needed to achieve sustainability targets. Thus, it is important to inform, involve, and participate actively in the development of sustainability goals. Clear communication and participation are the two elements essential for decision-making to make sustainability part of everyday life. Decision-making based on clear communication and participation is essential for sustainability to become part of everyday operations and, in the long term, a defining element of organizational culture.

3.1.3 Outcomes and Challenges

From the findings of the managers interviewed, it can be concluded that sustainable and green solutions have positively affected clubs in several ways – on one hand they helped run clubs more economically, and on the other, through increasing the marketability of clubs towards sponsors, fans, as well as local authorities. Meanwhile, club managers also highlighted several problems, such as a lack of funding opportunities, uncertainty of making the right choices in terms of technological solutions, and reluctance to change within the organisation. It can therefore be said that management strategies, the availability of resources, and innovation capabilities interact with each other and greatly influence the sustainability performance of a club.

3.1.4 Implications

These management interviews underscore that if management is engaged and actively leads innovation and sustainability practices that align with the club's strategy and organisational culture, it will be positively associated with organisational resilience and community engagement and result in a competitive advantage. Results showed that incorporating green practices into organisational strategy improves the sustainability of professional sports. Table 2 (Appendix) presents a thematic summary of qualitative interview findings derived from semi-structured management interviews.

3.2 Sustainable Organizational Roadmap

Based on the literature review and insights from management interviews, a structured roadmap was

developed to propose an enhancement of sustainable organisational performance for Hungarian football clubs (Figure 1).

3.2.1 Step 1: Develop a Sustainable Development Strategy

The literature insights showed us that proper strategic planning is critical for aligning environmental initiatives with organisational performance [27], [28]. Interviews showed that clubs that have clearly defined sustainability strategies can gain a better position to implement green infrastructure projects and realise stakeholder support.

3.2.2 Step 2: Engage and Educate Management

Management commitment is key to the effective implementation of sustainability and innovation [40]. Leaders should also have adequate knowledge about green innovation opportunities and practices. It is also important to have a commitment to integrating sustainability considerations into decision-making processes. This can contribute to the development of an organizational culture that supports green innovation and to improving organizational performance.

3.2.3 Step 3: Knowledge Management: Train Employees and Build Awareness

Educated management and managerial engagement are not enough for organisational success; operational staff are responsible for energy-efficient operations and sustainable facility management, and coaches must be engaged in innovative sports technologies in training programs.

The engagement for green innovation and long-term sustainable performance is crucial at all levels.

3.2.4 Step 4: Involve Stakeholders

The examined clubs noted that stakeholder participation enhances resource mobilisation and long-term sustainability outcomes, in line with the literature on collaborative innovation [17].

3.2.5 Step 5-6: Implement Sports and Sustainable Infrastructure Innovation

To develop sustainable and innovative sports and sports infrastructure, it is essential for a sports club to be aware of its values and have clear and unambiguous objectives. Subsequently, it should apply new, innovative, and sustainable solutions and introduce new technologies, which contribute to the more efficient operation of the facilities and the better performance of the athletes. Various digital tools, more modern training methods, and digital

sports tools that support performance monitoring serve to achieve better performance of the employees and athletes, which also contribute to the development of the athletes and the improvement of the efficiency of the organizational operation. Clubs can work on reducing the costs of keeping their facilities running while also being kind to the environment. They can do this by using energy-efficient methods, getting energy from renewable sources like solar panels or wind turbines, and using water-saving technologies and materials that are good for the environment. From talking to managers, it's clear that clubs that focus on making their facilities sustainable can save money and improve how people see them. If clubs combine these new ideas with other changes, they can work better with their partners, managers, and fans, which can lead to better results in both environmental and sports performance. To make sure they can keep going in a sustainable way, clubs need to make environmentally friendly practices a normal part of what they do every day. By doing so, clubs can achieve a win-win situation where they reduce costs, improve their reputation, and contribute to a more sustainable future. This can be a great way for clubs to show their commitment to the environment and to their community, while also improving their overall performance. It's a step in the right direction, and it can have a positive impact on the club, its members, and the environment. In the long run, making sustainability a priority can help clubs stay ahead of the game and achieve their goals while also being responsible and environmentally conscious. It's not just about saving money or improving reputation; it's about creating a better future for everyone involved. By incorporating green innovation practices into their daily operations, clubs can set an example for others to follow and make a real difference in their community. Overall, it's a great opportunity for clubs to make a positive impact and create a more sustainable future, while also improving their performance and reputation. By working together and making environmentally friendly practices a normal part of what they do, clubs can achieve great things and make a real difference.

3.2.6 Step 7: Monitor and Evaluate Outcome

Measuring the level and effects of sustainability and green innovation in sport organisations is not an easy task. First, it is important to see and acknowledge the organisational success and efficiency of a football club. Measuring success can be done through a few Key Performance Indicators (KPIs). A football club has multiple business areas,

such as the stadium and the apparel and equipment department. All KPIs need to be aligned with the sport organisation's long- and medium-term sustainable development strategy. Each KPI is related to the organisation's objectives and can be measured and monitored through the three sustainability pillars: economic, social and environmental. For example, the percentage of operating cost savings is an economic KPI. In terms of environmental KPIs, this can be energy consumption, CO₂ emissions, and water usage per season. Social KPIs, for example, include staff, coach, and fan engagement and satisfaction. Additionally, the percentage of sponsor retention, youth development, and other athlete performance indicators can be monitored. All indicators should be monitored regularly. The roadmap designed by the authors synthesises empirical knowledge and theoretical evidence. It places particular emphasis on the fact that strategic planning, management commitment, employee involvement, stakeholder collaboration, innovation adaptation, and performance monitoring are, conversely, strengthening modules for achieving sustainable organisational performance in Hungarian football clubs. Green infrastructure investments can be conceptually evaluated using cost-benefit indicators (e.g., payback period, energy savings, CO₂ reduction).



Fig. 1: Roadmap for sustainable organisational performance

Source: created by the authors.

In Figure 1, the numbers represent the steps of sustainable organisational development, and arrows represent connections between the roadmap steps. Steps follow each other in a logical order, although interaction amongst strategic planning, stakeholder engagement, innovation implementation, and performance monitoring is still fundamental. Therefore, the arrows signify both the directionality and the reciprocal conformation between the components of sustainable organisational performance.

4 Conclusion

The main goal of this study was to see how Hungarian football clubs can become more sustainable in terms of the economy, the environment, and society by making innovation and sustainability a big part of their plans and daily work. The paper presents ways and means for green innovation in sports organisations, based on available practices and identified challenges from scientific and managerial perspectives. Based on best practices and experiences of Hungarian football clubs, the study also presents global innovations (like the Sustainable Development Goals, the European Green Deal) and reveals their dissemination in practice. Large football clubs with greater financial resources are better at implementing sustainability initiatives in sports facilities than smaller ones. Some lessons can be drawn from the findings. 1) Greater commitment to sustainability from those in power with a long-term perspective (governance) 2) Innovation (not necessarily technological innovation, but also organisational, partnership, and cultural innovation) 3) Engagement of all stakeholders (club employees, sponsors, fans, local government, etc.) who need to make the sustainability investments of the club legitimate and durable. More successful performance could be attained by Hungarian football clubs if they were to explicitly form and continuously pursue a sustainability strategy and organise corresponding training for their managers and staff. Measuring their performance in these respects could also be recommended. The study is a qualitative, exploratory case study. It aims to gain insights into practice by using theories and concepts rather than generalising from empirical data that represent the entire population of interest. Three football clubs are presented as examples of the typology of modern-day organisational forms in Hungarian football. It would be desirable to include more clubs in the study and to use a quantitative methodology for the data collection. The results of this study could be based on and complemented by similar studies on sport clubs in the neighbouring Central European countries. Future studies on clubs' sustainability from various perspectives would be useful. It would also be important to hear the views of the coaches and athletes, for they are the core of the club, and their motivation and commitment are the basis of any club culture that would accept and implement ecologically friendly innovations. Above management and staff, fans, and local communities also play a very important role in sustainable football culture and development. By examining attitudes of all participants towards innovation and

sustainability, we can gain a deeper understanding of what works and what doesn't. In the long term, we need to study how sustainable infrastructure investments can affect not only clubs' financial performance but also athletes' performance and the community's well-being. This 360-degree study of football in Hungary and Central Europe could be a model for how sports can contribute to a more sustainable future and for balancing economic stability, environmental responsibility, and social welfare.

Declaration of Generative AI and AI-assisted Technologies in the Writing Process

During the preparation of this work, the author(s) utilized artificial intelligence (AI) technologies solely for the purpose of linguistic refinement and grammatical correction. Following the application of these tools, the author(s) comprehensively reviewed, verified, and edited the resulting text. The author(s) maintain full accountability and responsibility for the accuracy, integrity, and final content of the publication.

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Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

- György Korsós conducted the literature review and carried out interviews with the management representatives of Hungarian football clubs.
- Norbert Kovács supervised the research process and provided guidance on the research design and methodology.

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The authors have no conflicts of interest to declare that are relevant to the content of this article.

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APPENDIX

Table 1. Main Characteristics of the Football Clubs

Observation	Policy document
Sustainable development strategy	• None of the Football clubs has its own sustainable development strategy. However, both cities Győr and Mosonmagyaróvár, have their sustainable urban Development Strategy, which includes sustainable development objectives and measures in the fields of green innovation, digitalization, a resilient and competitive economy, energy efficiency in buildings and mobility, and the use of renewable energy sources.
Management innovation and knowledge management	• The Hungarian Football Association offers continuous training and education for management and employees, focusing on grassroots football across various forms, including children's, adults', veterans', futsal, disabled, and women's games. It provides club development training to maintain the quality of Talent Centres and District Centres and offers sports, health, and science courses. The Sports Health and Sports Science training emphasizes athlete health preservation and development. Additionally, the Coaching Training Institute provides education for football trainers, goalkeeper trainers, futsal trainers, and fitness coaches. The association also offers adult training to prepare participants as professionals who align with its values and can effectively contribute to domestic clubs.
Sport innovation	• In recent years, there has been a significant change in the training planning of athletes. A range of software and sports tools support both the trainers and the athletes. All the examined clubs use "Talent X" software. The software helps organize the data on the players and monitor their performance and the team's performance. Professional work can be tracked, and valuable statistics can be prepared in just a few steps. • Another popular but expensive tool is the "CATAPULT" system, used only by the most prominent clubs such as ETO FC. CATAPULT GPS (outdoor) and CATAPULT LPS (indoor) professional movement tracking systems developed to analyse sports movements enable accurate evaluation of training or performance during matches and extensive analysis, comparison, and data organisation. tool is the. • There is other but still less known but very innovative tools such as the "Nimbolo" which was developed and firstly used by the Ústökös FC. This tool targets and develops several critical skills in players, helping them to perform well and effectively on the pitch. NIMBOLO is a pioneering training tool designed to develop team sports players. The device has various features that allow players to develop various skills, such as communication and tactics, reaction speed and agility, creativity and game intelligence.
Stakeholders' engagement	• The legal changes of 2011 - which were also accepted by the European Union -they allowed profitable companies and enterprises to support spectacle team sports, such as football, with their corporate tax. This system provides benefits to sports associations and supporting companies at the same time. • For parents and supporters, the associations organize various community-shaping events every six months, such as a joint football game and a New Year's Eve celebration with various programs, commemorations, and awards.
R. & D expenditures	• Most of the clubs' income comes from the support of the corporate taxes of companies with the contribution of the Hungarian Football Association. Infrastructure development is mainly implemented from these two sources. In some cases, the municipality also supports the sports clubs, but this support depends on various things and changes year by year. The rest of the income comes from membership fees and is spent on operations. It was also found that most of the club's green innovation is covered by infrastructure development. Significant attention is paid to using renewable energy for lighting, heating, or cooling during the development of buildings or sports fields.

Source: Authors' compilation based on publicly available club information and management interviews.

Table 2. Green Innovation of the Hungarian Football Clubs

Observation	Policy document
Commitment of sustainable and green infrastructure development	• All four clubs (ETO FC Győr, Gyirmót FC Győr, Mosonmagyaróvári TE, and Ústökös FC Győr) clearly focus on upgrading and expanding their infrastructure with sustainability in mind. • Investments include modern, energy-efficient facilities featuring solar panels, thermal water wells, and eco-friendly building materials. • Ongoing projects involve constructing new sports centres and modernising pitches with sustainable solutions such as automatic irrigation, ground heating, and drainage systems
Energy and water management	• A strong emphasis is placed on reducing energy consumption—using LED lighting, motion sensors, energy-efficient building design, and planning for renewable energy use (notably solar energy). • Water conservation measures include watering pitches from drilled wells, installing percolators to cut water use by up to 50%, and planning thermal water wells for heating and sanitation. • Clubs actively monitor and optimise energy and water use to lower operational costs and minimise environmental impact.
Sustainable operation and environmental practices	• Clubs incorporate environmentally friendly materials for construction and renovation. • Daily operational activities focus on reducing waste—digital office processes, minimal use of plastic bottles, and waste separation.
Long-term Sustainability Strategies	• Construction and renovation projects prioritise sustainable materials and practices, reflecting a long-term commitment to reducing the ecological footprint. • Clubs have integrated sustainability into their strategic planning, with infrastructure development aligned with environmental principles. • Emphasis on future-proofing facilities by selecting sustainable materials, adopting renewable energies, and implementing energy-saving systems. • Their approach supports resilience, cost-effectiveness, and environmental responsibility over a decade

Source: Authors' thematic synthesis of semi-structured management interviews.