A Work Project presented as part of the requirements for the award of a Master's degree in Management from the Nova School of Business and Economics

Pioneering Sustainability in Polish Football: Strategic Initiatives for Environmental Leadership at Puszcza Niepołomice

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"What high-impact, low-effort environmental sustainability practices used by other football clubs can be adapted and implemented by Puszcza Niepołomice?"

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Abstract

The Work Project in this Field Lab explores how the Polish football club Puszcza Niepołomice, known for its connection to the local community and natural environment, can implement environmental sustainability strategies and use them for operational, social, and financial benefits. Addressing the gap in the club´s lack of a formal ESG strategy, this study investigates best practices from other football clubs and evaluates their adaptability to Puszcza Niepołomice ´s situation.

The research uses a mixed-method approach, combining expert interviews analyzed by Atlas.ti, stakeholder surveys through Qualtrics, and secondary research. The findings identify low-effort strategies with high-impact results, such as renewable energy initiatives, tree-planting programs, and matchday recycling competitions. These practices reflect the club´s identity and allow measurable sustainability solutions despite the club's limited resources.

The analysis also addresses significant benefits of sustainability, including enhanced stakeholder engagement, fan loyalty, and sponsorship opportunities.

By adopting these strategies and addressing these challenges, Puszcza Niepołomice can become a sustainability leader in Polish football, creating long-term growth, community engagement, and brand visibility. The thesis concludes with actionable recommendations to guide the club´s transition to a sustainable future.

Acknowledgments

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Table of Contents

1. Introduction

1.1 Problem Definition: Lack of a Formal Sustainability Strategy at Puszcza Niepołomice

Puszcza Niepołomice, a football club in Poland's first division, is deeply embedded within its local community and draws a significant part of its identity from its proximity to the Niepołomice Forest. The club's name, "Puszcza," which translates to "forest," reflects this connection. Despite this strong symbolic and geographical relationship with the environment, the club lacks a formal Environmental, Social, and Governance (ESG) strategy, specifically in environmental sustainability. This absence presents a significant gap for a club that aspires to position itself as a leader in sustainability within Polish football and beyond.

Globally, sports organizations are increasingly adopting sustainability practices to reduce their environmental impact, engage communities, attract sponsors, and build stronger brands. Football clubs face growing pressure to address sustainability challenges, including high energy consumption and plastic waste. However, the adoption of ESG strategies among Polish football clubs remains limited, creating an opportunity for Puszcza Niepołomice to serve as a pioneer in this field. This thesis seeks to bridge this gap by identifying sustainability practices that can be tailored to Puszcza's unique context.

At present, the club faces significant challenges, including the absence of a cohesive framework for implementing environmental sustainability across its operations. Critical areas, such as transitioning to renewable energy, reducing plastic waste, and creating community-based environmental education programs, remain unaddressed. Leveraging its strong ties to the local community and its family-friendly image, Puszcza Niepołomice has a unique opportunity to adopt sustainability initiatives that resonate with its stakeholders.

However, without a clear strategy to engage fans and residents in these efforts, the club risks missing an opportunity to lead community-driven sustainability.

In addition to addressing Puszcza's operational needs, this thesis highlights the broader significance of sustainability in sports by exploring how environmental strategies can enhance community engagement and a club's reputation. While many organizations focus on quantitative metrics like carbon reduction, this research underscores the value of qualitative outcomes, such as building stronger relationships with stakeholders and reinforcing the cultural identity of the club. These insights are intended not only to guide Puszcza but also to provide a framework for other Polish football clubs to follow.

Thus, the core problem facing Puszcza Niepołomice is how to develop and implement an effective sustainability strategy that aligns with its identity, engages stakeholders, and leverages best practices from other clubs. The underlying thesis directly addresses this challenge by identifying sustainability initiatives tailored towards Puszcza Niepołomice. By addressing this challenge, Puszcza has the potential to become a leader in Polish football, reducing its environmental impact while inspiring broader change within the industry.

2. Literature Review

In the following chapter, a review of the existing literature on sustainability in football will be presented. This literature review establishes the theoretical foundation for the thesis by exploring key themes such as the growing importance of sustainability in football, energy efficiency in stadiums, circular economy practices, regulatory compliance, community engagement, stakeholder theory, and the potential benefits of adopting green management practices. By examining these topics, the chapter underscores the significance of implementing sustainability strategies for Puszcza Niepołomice.

2.1 Growing Importance of Sustainability in Football

Sustainability has become an essential focus across many industries, and football is no exception. Football clubs were increasingly recognizing their environmental impact and were being pushed by both regulatory bodies and fan bases to adopt sustainable practices (Tettamanzi, Grazioli, and Murgolo 2023; Nishida, Demajorovic, and De Morais 2024). Global football generated significant waste and greenhouse gas emissions, largely due to energy use in stadiums, team and fan travel, and matchday operations (Robak and Sahhar 2022). For example, the environmental footprint of major events like the FIFA World Cup and UEFA European Championship was immense, with emissions often running into the millions of tons (Uva 2021; Dragović 2024). In response, clubs across Europe were beginning to adopt more sustainable models that reduced their environmental impact and engaged their communities in meaningful ways (Ketley 2019; Centenaro and Rosell 2021).

Puszcza Niepołomice is uniquely positioned to lead sustainability efforts within Polish football due to its close connection to the natural environment, symbolized by its ties to the Niepołomice Forest (Cebula, personal communication, 02.10.2024).

The club’s proximity to this ecological landmark makes its lack of an ESG strategy a significant gap, especially considering growing global trends toward sustainability in sports (Trendafilova et al. 2014).

2.2 Energy Efficiency and Renewable Energy in Stadiums

Energy consumption in stadiums represented one of the largest environmental impacts for football clubs, according to Villarino (2021) and Nishida et al. (2024), respectively. A growing number of clubs had started to invest in energy-efficient infrastructure to reduce their reliance on non-renewable energy sources and decrease their overall carbon footprints (Robak and Sahhar 2022; Bauers et al. 2023). Forest Green Rovers, often seen as the world’s greenest football club, set a notable example. The club's stadium was powered by 100% renewable energy sourced from wind and solar power. Additionally, Forest Green had installed solar panels to provide a significant portion of its electricity (Campelli 2020). Their approach demonstrated how even smaller clubs could take the lead in sustainable energy management by working with energy providers and investing in green technology.

The need for energy efficiency was recognized across European football, with clubs like Olympique Lyonnais and Hamburger SV introducing comprehensive energy management systems (Centenaro and Rosell 2021). Olympique Lyonnais, for instance, had worked with local authorities to create a stadium that significantly reduced energy consumption through systems that regulated heating, cooling, and lighting. These measures had led to a substantial reduction in the club's carbon emissions (Robert and Thomas 2019; Faibis 2023).

In terms of policy, UEFA's ESG strategy for its 2024 championship highlighted the importance of sustainability in event management, particularly in energy use and efficiency (Uva 2021). The strategy outlined clear objectives for reducing energy consumption in stadiums and encouraged the use of renewable energy sources.

As Puszcza Niepołomice explores opportunities to implement an ESG strategy, it could draw on these examples and incorporate renewable energy solutions like solar panels or bioenergy to power its facilities, though the limited financial resources of the club must be considered, respectively.

2.3 Circular Economy and Waste Reduction in Football Operations

The concept of circular economy—where resources were kept in use for as long as possible, waste was minimized, and materials were recycled—had found increasing application in the football industry (Marrucci, Daddi, and Iraldo 2023). Major European clubs had already demonstrated leadership in adopting circular economy principles to reduce their environmental impact. FC Barcelona, for example, had implemented a waste management system that significantly reduced the amount of waste sent to landfills by focusing on recycling and composting (FC Barcelona 2023).

On matchdays, stadiums could generate vast amounts of waste, particularly through single-use plastics and food packaging (Dolles and Söderman 2010). Forest Green Rovers again served as an example by introducing eco-friendly alternatives such as reusable cups and banning single-use plastics throughout their stadium (Forest Green Rovers FC 2021). The club had also implemented a zero-waste approach to food, using biodegradable packaging and recycling food waste for compost (Watson 2018).

In Puszcza’s case, transitioning to a circular economy could involve partnerships with local recycling firms and sustainable suppliers to reduce plastic use and encourage waste separation during matches.

2.4 Regulatory Compliance and Reporting Standards in Football

In recent years, there has been a shift in how football clubs were held accountable for their sustainability efforts.

Regulatory compliance, particularly with ESG reporting standards such as the Global Reporting Initiative (GRI), had become increasingly important (Marlow, Harper, and Lanc 2024). UEFA, through its Football Sustainability Strategy 2030, had established clear guidelines for clubs to follow, aiming to achieve carbon neutrality across European football by 2030 (Daddi et al. 2021).

Clubs like VfL Wolfsburg had been at the forefront of this movement, releasing detailed sustainability reports that tracked their progress in reducing environmental impacts and meeting social responsibility goals (VfL Wolfsburg-Fußball GmbH 2023). Wolfsburg's reporting was aligned with international standards such as the GRI, and the club had committed to regular updates to ensure transparency and accountability. These reports were valuable not only for internal use but also for engaging fans, sponsors, and other stakeholders in the club's sustainability journey, asserted VfL Wolfsburg-Fußball GmbH (2023).

For Puszcza, adopting similar reporting standards would be a critical step in establishing itself as a sustainability leader in Polish football. By complying with established frameworks like GRI and/or UEFA's guidelines, the club would be able to track its sustainability performance, set clear goals, and communicate its achievements to both the community and potential sponsors.

2.5 Community Engagement through Sustainability

Community engagement was one of the most powerful tools football clubs had to promote sustainability. As "anchor institutions," clubs often served as pillars of their communities, capable of mobilizing large groups of people for social and environmental causes (Campelli 2020; Zülch, Cruz, and Kirsch 2021).

Forest Green Rovers, for example, had engaged its local community in sustainability through environmental education programs and by partnering with schools to promote eco-friendly practices (Comrad 2019). Their fanbase had become actively involved in green initiatives, reinforcing the club's brand as a leader in sustainability.

The importance of community involvement was also emphasized by Real Betis' "Forever Green" initiative, which was a project that aimed to reduce carbon emissions and improve environmental conditions in Seville, Spain (Muela 2024).

An energy efficiency project, for instance, aimed to make Real Betis carbon neutral by 2030 through the installation of energy-saving systems and water-saving solutions at their stadium and training facilities (Mora, Portet, and Vela 2021; Hernández et al. 2023). These projects did not only ensure regulatory compliance in the long run, but also seemed to positively resonate with the fans, according to Ódor et al. (2020).

2.6 Stakeholder Theory and Sustainability

Stakeholder theory, which emphasizes the importance of engaging all parties affected by an organization's operations, is highly relevant in the context of football sustainability (Senaux 2008; Yiapanas, Thrassou, and Vrontis 2022; Mahajan et al. 2023; Houben 2023). In football, key stakeholders include fans, sponsors, local governments, and regulatory bodies, all of whom have a different interest in the club's sustainability practices (Walters and Tacon 2010; Kulczycki and Koenigstorfer 2016; Open University 2022).

While some research suggested that involving stakeholders in sustainability decisions led to higher engagement (Kulczycki and Koenigstorfer 2016), there was research suggesting that a stakeholder's sustainability interest differed from country to country and could even be potentially non-existent.

Hernández et al. (2023) and Thorogood (2023) indicated that differences in stakeholder interest regarding sustainability in football could vary significantly from country to country and were dependent on national factors, such as local governance, economic conditions, and cultural priorities. In countries like Germany, stakeholders, including fans and government bodies, put significant pressure on football clubs to adopt sustainable practices, with initiatives like environmental certifications becoming more common (Zülch, Cruz, and Kirsch 2021). In contrast, other countries might not have seen the same level of stakeholder interest or enforcement due to differing dynamics, as asserted by Hernández et al. (2023) and Thorogood (2023), respectively.

VfL Wolfsburg, for instance, has successfully integrated stakeholder theory into its sustainability strategy by engaging its fans, sponsors, and local community in discussions around environmental and social responsibility (VfL Wolfsburg-Fußball GmbH 2023). The club regularly sought input from these groups through surveys, ensuring that its sustainability initiatives aligned with stakeholder expectations.

But with consideration of literature suggesting that stakeholder interest varies between countries, it has yet to be determined whether stakeholders feel the need to be involved in Puszcza's sustainability practices.

2.7 Benefits derived from Adoption of Green Management Practices

The adoption of green management practices was driven by a combination of environmental, social, and financial incentives. Football clubs that prioritized sustainability often saw significant benefits, as sponsors increasingly valued environmental responsibility (Podewils 2021; Hensley 2023). Furthermore, additional financial advantages, such as access to green sponsorships and reduced operational costs through energy efficiency, could also be realized through the implementation of these green management practices, according to Tsuji and McCullough (2019), Geer (2023), and Johansson (2024), respectively.

For Puszcza, adopting green management practices may offer an opportunity to enhance the club's competitive standing by attracting environmentally conscious sponsors. In addition to this, the club would be in compliance with regulations, set by the UEFA, which will materialize in the years to come. These benefits, however, can only be capitalized on if Puszcza's stakeholders in Poland ultimately value the club's sustainability initiatives.

2.8 Conclusion: Opportunities for Puszcza Niepołomice through Sustainability Initiatives

The literature clearly demonstrates that football clubs can play a significant role in promoting sustainability. By focusing on energy efficiency and regulatory compliance, Puszcza Niepołomice can not only reduce its environmental impact but also capitalize on additional green funding, if valued by the club's Polish stakeholders, respectively.

3. What strategies can Puszcza Niepołomice adopt to enhance its environmental sustainability by leveraging best practices from other football clubs?

Based on the previously mentioned problem definition and the literature review, the overarching research question has been defined: *What strategies can Puszcza Niepołomice adopt to enhance its environmental sustainability by leveraging best practices from other football clubs?*

This overarching research question seeks to understand how Puszcza Niepołomice can improve its environmental sustainability by adopting best practices from other football clubs. Given the club's limited financial resources, focusing on strategies that require low implementation effort but offer high impact is essential. The emphasis on high-impact, low-implementation effort strategies is a deliberate response to Puszcza Niepołomice's limited financial resources, ensuring that the club can pursue meaningful sustainability initiatives without incurring prohibitive costs. This approach not only aligns with Puszcza Niepołomice's ambition to become a leader in sustainability within Polish football but also ensures that the recommended strategies are feasible and actionable within their resource constraints.

Building up on this, two research questions will guide the research by narrowing the scope to practical examples and assessing the potential advantages for the club, which ensures that the analysis remains targeted.

3.1 Research Question: What high-impact, low-effort environmental sustainability practices used by other football clubs can be adapted and implemented by Puszcza Niepołomice?

4. Methodology

In the following chapter, the methodological approach adopted for the underlying thesis will be presented and explained. This methodological approach guarantees a structured and easy to understand method for addressing the research question of the research at hand. Firstly, the overall approach of the research will be outlined and classified. Following that, detailed descriptions of the data collection and data analysis methods for each individual research question will be provided.

4.1 Research Design

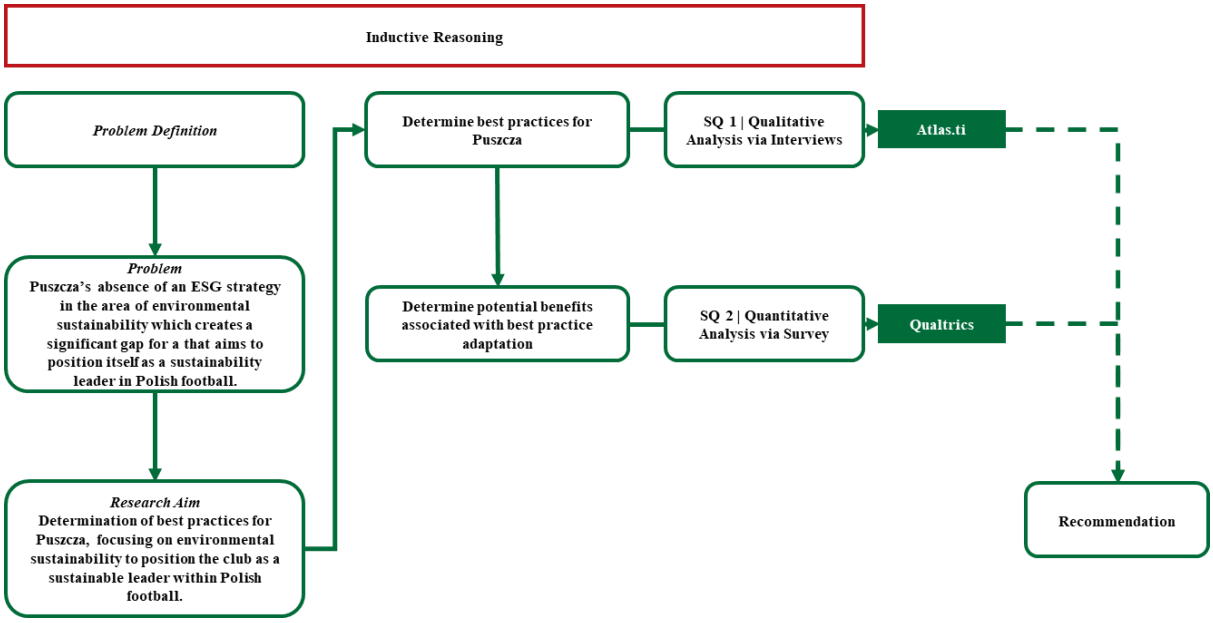

Figure 1 Research Design Overview | Own Creation

After elaborating on how the aim of this research was going to be approached, it was necessary to mention that the well-established tool Atlas.ti aided in the analysis process of the first research question, as shown in the Figure 1. Given that Atlas.ti had a proven track record of being utilized for data analysis within a professional setting, it was considered a reliable option for the purpose of answering research question one (New York University 2023).

Inductive reasoning guided the research process, as it involves deriving general conclusions from specific observations. Unlike deductive reasoning, which begins with a theory (Streefkerk 2023), inductive reasoning was more suitable for this exploratory study, allowing the research to emerge from observed data.

This was because the problem definition had been established in conjunction with Marek Cebula (Business Development Director of Puszcza Niepołomice), followed by the identification of a research topic and formulation of research questions based on interactions with Marek Cebula.

4.2 Research Classification: Applied Research

Basic Research	Applied Research
Develop universal knowledge	Understand & address problems
Answer scientifically-based questions	Answer practical, relevance-based questions
Discover statistically significant relationships or effects	Discover practically significant relations or effects

Figure 2 Research Classification Overview | Own Creation

As previously mentioned, the underlying thesis followed an exploratory nature. To categorize the research classification of a graduation thesis, it was important to consider the two primary concepts of research as identified in scholarly literature. Surbhi (2018) suggested that basic and applied research were the two main classifications within the scientific community.

Basic research primarily focused on expanding scientific knowledge and comprehending fundamental principles, without immediate practical implementation. Schauz (2014) further explained that basic research was driven by curiosity and the pursuit of exploring new frontiers of knowledge. Consequently, basic research was commonly conducted within academic circles, with the primary objective of advancing understanding across various disciplines.

In contrast, applied research concentrated on addressing specific problems and generating practical solutions (Surbhi 2018). It was typically driven by the needs and preferences of clients or organizations. Applied research involved the application of existing knowledge to real-world situations, with the aim of developing products, technologies, or services that had practical applications. Therefore, it was frequently conducted within industrial and organizational contexts (Schauz 2014).

It was clear that the underlying study was in line with applied research. The research's aim of determining best practices for Puszcza Niepołomice, focusing on environmental sustainability to position the club as a sustainable leader within Polish football, clearly had a real-life application focus, which is why the term applied research was applicable for the thesis at hand.

Scientific literature identified three distinct types of applied research, which could be further classified as research and development, evaluation research, and action research (George 2023). Among these categories, the most suitable one for this research project was action research. This classification aligned with the objective of providing an actionable recommendation for Puszcza on how to begin its transition towards becoming a sustainability-driven football club within Poland.

4.3.1 For Research Question: Expert Interviews & Literature Synthesis

The first research question: “What high-impact, low-effort environmental sustainability practices used by other football clubs can be adapted and implemented by Puszcza Niepołomice?”, has been addressed through expert interviews.

The professional perspectives and insights from the interviews laid the foundation of providing Puszcza with a set of best practices that it could apply. The three interview participants were specifically chosen due to their extensive exposure to sustainability practices at football clubs, ensuring that their insights formed a credible and relevant basis for answering research question one.

In addition to this, the interviews lasted between 45 and 90 minutes, not exceeding 120 minutes, as longer interviews ran the risk of diminishing the quality of discussion and leading to exhaustion (MWResearch 2022).

4.4 Data Analysis

Following the data collection approach, the following sub-chapter depicts the analysis methods utilized for this research. An illustration of the data analysis approach can be found below.

Sub-Question	Research Method	Data Collection Method	Data Analysis Method
Sub-Question 1 | Best Practice Identification	Primary Research	Expert Interview	Atlas.ti
Sub-Question 2 | Benefit Determination	Primary Research	Survey & Expert Interview	Qualtrics

Figure 3 Data Analysis Overview | Own Creation

4.4.1 For Research Question: Atlas.ti-Based Thematic Analysis

Thematic analysis was chosen as the preferred data analysis method for the research question, which employed a total of three expert interviews answer the research question. Thematic analysis is a common procedure when it comes to the analysis of qualitative data (Braun and Clarke 2006; Huen 2024). It includes a focus on identifying, understanding, and analyzing reoccurring data patterns within the dataset of qualitative data analysis.

The benefit of thematic analysis is that it is clear-cut and excellent at summarizing, emphasizing key components, and interpreting a range of data.

While there was guiding literature suggesting ways to adequately conduct a thematic analysis, the decision was made to utilize the systematic text condensation by Malterud (2012).

The systematic text condensation was chosen because it offered a more descriptive and explorative approach for analyzing qualitative data, thereby fulfilling the requirements of the thesis at hand. The procedure of systematic text condensation involved four steps: gaining a total impression (1), identifying and sorting meaning units (2), condensing them into meaningful codes (4), and synthesizing them into descriptions and concepts (4).

Based on the four steps outlined by Malterud (2012), the following structure was employed. To address the process of gaining a total impression, one had to familiarize oneself with the data gathered. Thus, the recording was transcribed, and the text was read several times to further comprehend the questions and answers.

Following this, the transcript was prepared for coding. Therefore, the transcript was read again, sentences or certain words were highlighted, and codes or descriptions were created to define the content of the words. There could be an infinite number of codes and ensuring that each sentence and word was read carefully made sure that every aspect of the interview was considered.

To synthesize the codes into descriptions, themes were created. This was done by identifying similarities and patterns that the codes had in common, and then developing themes that described the codes. At this stage, codes that were not re-occurring or had no value for the data and aim of the interview were disregarded. Once the codes and consequent themes were established, they were reviewed to ensure that the two factors matched and could provide an accurate representation of the dataset.

Finally, the results of the thematic analysis were explained and analyzed. This was done in the following way for each theme: the frequency of themes was identified, followed by their definition, and examples of usage within the dataset.

Atlas.ti, a widely used application that facilitates computer-aided thematic analysis and can generate various methods of output, such as graphs or diagrams, was utilized as an analytical tool to not only visualize the complex dataset but also served as a foundation for the analysis of the thematic data (New York University 2023; Sulaiman, Shaifuddin, and Samsudin 2024).

The figure below illustrates Malterud's (2012) steps, which have been applied to give the thematic analysis a structured framework.

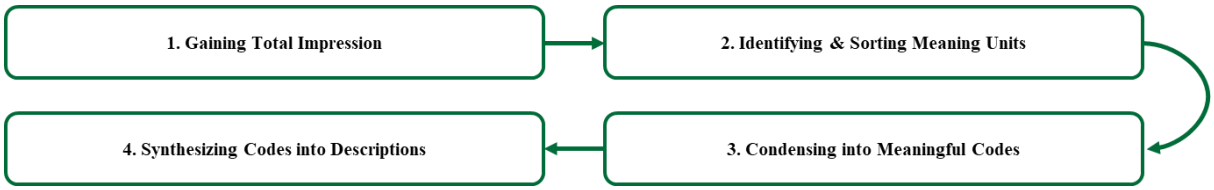

Figure 4 Thematic Analysis Overview | Own Creation Based on Malterud (2021)

While there were also alternative methods of analyzing qualitative research, such as statistical analysis (Ponto 2015) and narrative analysis (Kaluza 2023), thematic analysis was best suited for this research as it was a flexible model that could be adjusted depending on the requirements (Nowell et al. 2017). Also, this method allowed the identification of the most important aspects before conducting any other form of analysis.

However, one limitation of this was also its flexibility. While it could be adjusted and served as a positive feature, it could also lead to inconsistencies when creating codes and themes and thereby skew the results (Nowell et al. 2017). One implication for this research could have been that certain themes were disregarded based on bias and the degree of perceiving them to be useful when, in fact, they were not. This could, to some extent, have skewed the results of the outcome

5. Discussion

After elaborating on the problem definition, literature review, and research methodology, this chapter moves to the analysis and discussion of the research question. The focus will be on integrating insights derived from qualitative and quantitative research to address the core topics of this study. First, the practices successfully implemented by other football clubs to enhance environmental sustainability will be analyzed, particularly regarding their relevance and adaptability for Puszcza Niepołomice. These practices will be assessed in the context of their feasibility and alignment with the club's identity and resource constraints.

Subsequently, the potential benefits of these practices, such as improved community engagement, fan engagement, stakeholder management, and enhanced sponsorship opportunities, will be examined through stakeholder feedback.

By addressing these elements systematically, this chapter aims to provide a solid foundation for actionable recommendations that align with Puszcza Niepołomice’s strategic goals.

5.1 What high-impact, low-effort environmental sustainability practices used by other football clubs can be adapted and implemented by Puszcza Niepołomice?

As outlined in the research methodology, three expert interviews were conducted to gather insights on what high-impact, low-effort environmental sustainability practices used by other football clubs can be adapted and implemented by Puszcza Niepołomice.

The interviews involved the following participants: a sustainability expert from the German football club 1. FSV Mainz 05; Jarosław Żubka, the sustainability officer at the Polish football club Warta Poznań; and Filipe Fernandes, a business development manager at Windcredible with expertise in sustainability practices among Portuguese football clubs.

As part of the systematic text condensation approach outlined by Malterud (2012), the first step of gaining a total impression of the data was applied by thoroughly reviewing the interview transcripts to develop an initial understanding of the key themes and patterns. All three interview transcripts can be found in Appendix A, B and C.

In line with the second and third step of the systematic text condensation, the analysis of the interviews involved identifying and coding key words and phrases. The thematic analysis utilized these codes, selected based on their frequency and relevance to the research objective of identifying high-impact, low-effort environmental sustainability practices employed by other football clubs that could be adapted and implemented by Puszcza Niepołomice.

Step 2 and 3 of the Systematic Text Condensation
Identification of Meaning Units & Condensing them Into Codes

Codes		
Integration of wind turbines and solar panels	Feasibility assessments for renewable energy in football stadiums	Hybrid energy solutions for high efficiency
Community-driven sustainability initiatives	Fan engagement in eco-friendly practices	Recycling systems and infrastructure
Replacing with biodegradable alternatives	Phased implementation of sustainability projects	Attracting sponsors through sustainability projects
Funding mechanisms such as subsidies and green bonds	Cost-sharing with sustainability-focused sponsors	Engaging fans in educational workshops
Partnerships with renewable energy providers	Stakeholder skepticism towards sustainability benefits	Leveraging sustainability for competitive advantage
Carbon audits and emissions reduction	Transition plans to low-emission operations	Awareness campaigns for proper waste separation
Using football operations as a platform for environmental messaging	Showcasing sustainability progress through metrics	Communicating sustainability efforts to sponsors
Integrating water-saving solutions in stadiums	Developing fan campaigns promoting waste reduction	Collaborating with schools for environmental education
Exploring solar-powered cooling and heating systems	Engaging employees in green initiatives	Partnering with local environmental organizations
Establishing measurable sustainability goals	Building renewable infrastructure for training facilities	Creating fan-driven green ambassador programs
Local tree-planting programs	Eliminating single-use plastics	High costs of renewable installations
Incorporating sustainability into operational workflows	Establishing zero-waste goals for facilities	Installing LED lighting across facilities
Building ecological content into fan merchandise	Highlighting environmental impact in annual club reports	Energy audits for identifying inefficiencies
Reducing landfill waste through compostable materials	Building a brand identity around green initiatives	Creating ecological education centers
Building fan loyalty through green initiatives	Encouraging public transport use for match days	Highlighting cost savings from energy-efficient upgrades
Hosting community clean-up drives	Promoting fan participation in tree-planting events	Developing mobile apps for fan involvement in sustainability
Collaboration with local governments for green initiatives	Organizing matchday recycling competitions	Hosting carbon-neutral match days through offset programs

Figure 5 Codes Overview | Own Creation

As seen in the table above, these were the codes generated through the interview transcripts. These phrases and words were marked due to their importance for exploring environmental best practices employed by other football clubs that could be adapted and implemented by Puszcza.

After elaborating on the first three steps of the systematic text condensation process—gaining an overall impression of the interview transcripts, organizing the data, and developing meaningful codes to capture key messages from the interviews—the fourth and final step of Malterud's text condensation will now be addressed. This step, which involves synthesizing the codes into descriptive themes, forms the basis for analyzing the research question at hand.

Building on above, themes corresponding to the generated codes were developed, as shown in Figure 8. These themes were identified by analyzing the codes and assigning a topic that encapsulates their meaning. Consequently, multiple codes could be grouped under the same theme if they shared similar relevance. Additionally, this stage entails the exclusion of codes that were either not repeated within the interviews or did not contribute meaningfully to the main research objective of the research question (Medelyan 2023). The table below illustrates the themes and their corresponding codes and the colors that were developed throughout the interviews.

	Step 4 of the Systematic Text Condensation Synthesizing Codes into Descriptions and Concepts		
Theme	**Renewable Energy Integration**	**Carbon Reduction and Neutrality**	**Community and Fan Engagement**
Code	Integration of wind turbines and solar panels	Carbon audits and emissions reduction	Fan engagement in eco-friendly practices
	Feasibility assessments for renewable energy in football stadiums	Zero carbon mobility	Hosting community clean-up drives
	Hybrid energy solutions for high efficiency	Hosting carbon-neutral match days through offset programs	Organizing matchday recycling competitions
	Exploring solar-powered cooling and heating systems	Local tree-planting programs	Creating fan-driven green ambassador programs
	Building renewable infrastructure for training facilities	Promoting fan participation in tree-planting events	Engaging fans in educational workshops

Figure 6 Themes Overview | Own Creation

The three themes—Renewable Energy Integration, Carbon Reduction and Neutrality, and Community and Fan Engagement—were selected as they aligned with the aim of research question and reflected key practices from other football clubs. Renewable Energy Integration focuses on implementing technologies such as wind turbines and solar panels in stadiums and training facilities.

The second theme, Carbon Reduction and Neutrality, concentrates on reducing carbon emissions through initiatives such as carbon audits, tree-planting programs, hosting carbon-neutral matchdays, and promoting sustainable fan mobility. These practices were impactful, visible, and community-oriented while requiring manageable financial and operational effort, according to the interview participants, respectively.

The justification for selecting the theme of Community and Fan Engagement, based on the interviews, lies in its demonstrated effectiveness at other football clubs and its alignment with Puszcza Niepołomice's strengths. The interviews highlighted how clubs successfully implemented practices like recycling competitions, ambassador programs, and educational workshops to foster community involvement in sustainability initiatives. For instance, Warta Poznań's tree-planting program engaged fans and local groups, creating a strong sense of participation and collective responsibility.

Such practices were cited as instrumental in not only promoting environmental awareness but also strengthening the bond between the clubs and their stakeholders. Given Puszcza Niepołomice's deep ties to its local community and its identity as a family-friendly club, these practices offer a relevant and effective way to integrate stakeholders into its sustainability journey, fostering loyalty while addressing environmental goals.

Collectively, these three themes were selected because they directly addressed the goals of research question by identifying practices that are actionable and relevant to Puszcza Niepołomice. They reflect proven sustainability measures from other clubs that can be adapted to Puszcza’s context.

Since not all codes corresponding to the themes can be applied by Puszcza Niepołomice simultaneously and due to the 15-page limitation bound to this analysis, the decision has been made to select one best practice derived from each theme. This approach ensures that the analysis remains focused while offering three best practices tailored to Puszcza’s context.

The next step of the analysis is aimed at determining which of the three best practices—one from each theme—would ultimately be advised for Puszcza Niepołomice to adapt. To achieve this, two decision-making criteria were utilized: the frequency of mentions for each best practice within the interviews and an effort/impact assessment. Both criteria were considered equally important, with each being weighted at 50%, to derive a balanced and evidence-based recommendation.

The first decision-making criterion was the frequency of mentions for each best practice within the interview data. This was crucial for understanding which practices were emphasized most often by the interview participants and were therefore likely to have greater relevance and applicability for the underlying research. To visualize these frequencies, three Sankey diagrams were developed—one for each theme. Each diagram illustrated the flow of mentions from specific interviewees to the corresponding best practices, providing a clear overview of how often each practice was highlighted during the discussions.

Sankey diagrams have been chosen for this instance as the frequently occurring codes can be easily located from the thickness of the flow lines in the diagram, according to Cowan, Sood, and Gibson (2020), respectively.

The second decision-making criterion was the effort/impact assessment. This assessment was conducted using an implementation matrix, which categorized each best practice based on its expected level of effort to implement and its potential sustainability impact (Sudnam 2024). This step was essential because it directly aligned with the research objective of identifying low-effort, high-impact practices for Puszcza Niepołomice.

By evaluating the effort required to implement each practice against its potential environmental benefits and operational feasibility, this matrix offered a structured approach to prioritize actionable and effective practices.

Both criteria—the frequencies of mentions and the effort/impact assessment—were given equal weighting in the final decision-making process, with each accounting for 50% of the overall evaluation in terms of which best practices to pursue. This 1:1 blend ensured that the recommendations were grounded in both the insights derived from the interviews and the practical feasibility of implementation. The combination of these two criteria provided a comprehensive framework for selecting the three best practices most suitable for Puszcza Niepołomice to implement.

The same methodology was consistently applied across all three themes—Renewable Energy Integration, Carbon Reduction and Neutrality, and Community and Fan Engagement. By utilizing Sankey diagrams to visualize the frequency of mentions and decision-making matrices to evaluate effort and impact, the process ensured that each best practice was identified systematically and fairly.

This standardized approach ensured that the selected best practices were aligned with the goal of identifying high-impact, low-effort sustainability measures suitable for Puszcza Niepołomice.

5.1.1 Best Practice Analysis for Identified Renewable Energy Integration Theme

Building on the previously outlined approach, the following Sankey diagram illustrates the frequency of mentions for best practices within the Renewable Energy Integration theme as derived from the interview data. This visualization highlights how often each practice was emphasized by the interview participants, providing insight into which practices were most frequently discussed and, therefore, potentially more relevant for Puszcza Niepołomice to consider.

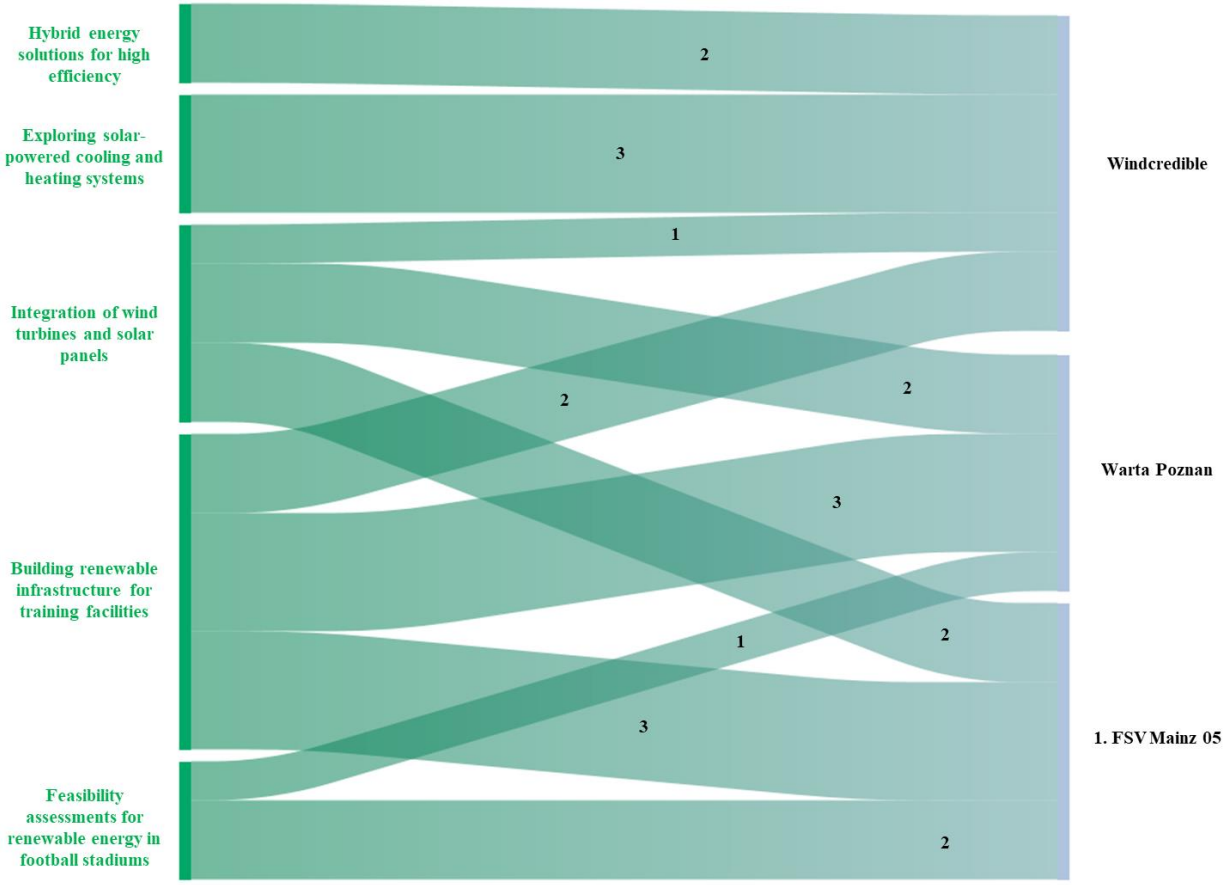

Figure 7 Best Practices Overview for Renewable Energy Integration Theme | Own Creation

The Sankey diagram above aims to illustrate the frequency of mentions for best practices within the Renewable Energy Integration theme, derived from the interview participants' responses. The practices identified are presented in green, as green signifies the theme of Renewable Energy Integration, as outlined in the table of themes and their corresponding codes, respectively.

	Code	Frequency
Renewable Energy Integration	Hybrid energy solutions for high efficiency	2
	Exploring solar-powered cooling and heating systems	3
	Integration of wind turbines and solar panels	5
	Building renewable infrastructure for training facilities	8
	Feasibility assessments for renewable energy in football stadiums	3

Figure 8 Frequencies Overview for Renewable Energy Integration Theme | Own Creation

The table above provides the frequency of mentions for each code within the Renewable Energy Integration theme, as derived from the interviews. The most frequently mentioned practice, building renewable infrastructure for training facilities, with a total of 8 mentions, stands out as a key area of focus. This indicates strong agreement among interview participants regarding its importance and relevance. Such emphasis suggests that this best practice is worth considering for Puszcza Niepołomice.

To determine the best practice, the analysis incorporated both the frequency of mentions from the interviews and the implementation matrix to ensure that the selection of the best practice considered not only its presence in the interviews, but also its feasibility (Vargas 1990).

The first step included the frequency score computation for each best practice. This was achieved by normalizing the frequency data of the codes. Each frequency value was divided by the highest frequency observed within the theme, ensuring that the scores were scaled between 0 and 1. For instance, the code frequency of building renewable infrastructure for training facilities, which was mentioned 8 times, was divided by 8 to yield a normalized score of 1.0, while integration of wind turbines and solar panels, mentioned 5 times, yielded a normalized score of 0.63.

The second step involved developing the implementation matrix, which assigned numerical values to the effort and impact of each best practice. Effort was assessed based on the complexity, cost, and time required to implement each practice, with higher scores indicating greater effort.

Impact was evaluated in terms of the sustainability benefits and long-term gains of the practice, with higher scores reflecting higher impact (Appendix D). For instance, building renewable infrastructure for training facilities was rated as having a medium-low effort (score of 4) due to its smaller scale and localized focus, and a very high impact (score of 9) because of its potential to positively impact a football club's green image, according to Chen (2013), respectively. The implementation score was then calculated for each practice using the following formula: $Implementation\ Score = \frac{Impact\ Score - Effort\ Score}{Highest\ Impact/Effort\ Delta\ in\ the\ Dataset}$

This formula emphasizes high-impact and low-effort practices by rewarding practices with a higher difference between impact and effort. These scores were subsequently normalized between 0 and 1, allowing for comparability with the frequency scores. This was achieved by dividing each calculated implementation score by the highest implementation score in the dataset.

The last step included combining the normalized frequency and implementation scores to calculate a blended score for each practice. This was done by applying the weightages of 50% to each score, as outlined in the previous paragraphs. The following formula was considered for this:

$$Blended\ Score = 0.5 \times Frequency\ Score + 0.5 \times Implementation\ Score$$

Based on these computations, the final decision-making table is presented below.

Best Practice	Frequency	Impact	Effort	Frequency Score	Implementation Score	Blended Score
Hybrid energy solutions for high efficiency	2	8	7	0.25	0.3	0.28
Exploring solar-powered cooling and heating systems	3	7	6	0.38	0.5	0.44
Integration of wind turbines and solar panels	5	9	8	0.63	0.5	0.57
Building renewable infrastructure for training facilities	8	9	4	1.0	1.0	1.0
Feasibility assessments for renewable energy in football stadiums	3	6	3	0.38	0.3	0.34

Figure 9 Implementation Matrix for Renewable Energy Integration Theme | Own Creation

5.1.2 Best Practice Analysis for Identified Carbon Reduction and Neutrality Theme

The approach applied in this chapter mirrors the methodology outlined in 5.1.2, where the frequency of mentions from the interviews and the implementation matrix were blended to determine the most suitable best practice. To begin the analysis, the Sankey diagram below illustrates the frequency of mentions for the practices within the Carbon Reduction and Neutrality theme, as derived from the interview data.

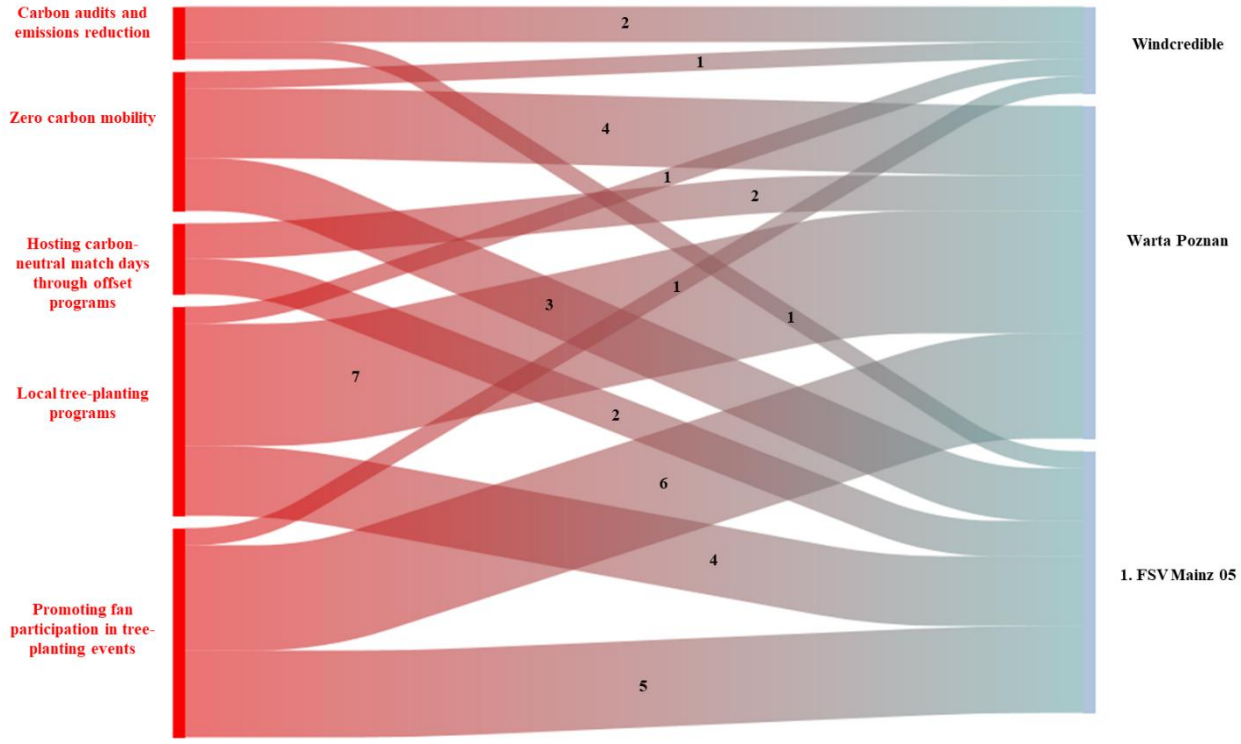

Figure 10 Best Practices Overview for Carbon Reduction and Neutrality Theme | Own Creation

	Code	Frequency
Carbon Reduction and Neutrality	Carbon audits and emissions reduction	3
	Zero carbon mobility	8
	Hosting carbon-neutral match days through offset programs	4
	Local tree-planting programs	12
	Promoting fan participation in tree-planting events	12

Figure 11 Frequencies Overview for Carbon Reduction and Neutrality Theme | Own Creation

Also here, the Sankey diagram and frequency table show how often each best practice was mentioned, providing the starting point for combining these results with the impact and effort assessment in the decision-making matrix.

Best Practice	Frequency	Impact	Effort	Frequency Score	Implementation Score	Blended Score
Carbon audits and emissions reduction	3	8	6	0.25	0.67	0.46
Zero carbon mobility	8	9	7	0.67	0.67	0.67
Hosting carbon-neutral match days through offset programs	4	7	5	0.33	0.5	0.42
Local tree-planting programs	12	9	3	1.0	1.0	1.0
Promoting fan participation in tree-planting events	12	8	4	1.0	0.83	0.92

Figure 12 Implementation Matrix for Carbon Reduction and Neutrality Theme | Own Creation

As already done for the best practice selection corresponding to the renewable energy integration theme, the decision-making matrix for the carbon reduction and neutrality theme was developed by blending the frequency of mentions from the interviews with the impact and effort assessments for each best practice.

The results highlighted local tree-planting programs as the most suitable best practice, achieving the highest blended score of 1.0. This was driven by its high frequency of mentions (12) and a favorable impact-to-effort ratio. With a low effort score of 3, due to the relative simplicity of organizing tree-planting programs, as asserted by Harbour (2022), and a very high impact score of 9, reflecting its significant potential to improve Puszcza Niepołomice's environmental standing through visible and measurable sustainability actions, this practice emerged as the most actionable and impactful recommendation under this theme.

In contrast, promoting fan participation in tree-planting events scored slightly lower in the implementation matrix due to a higher effort score of 4. While engaging fans directly in tree-planting initiatives was impactful, this approach required additional logistical complexity, according to Chmielewski (2024), respectively. Coordinating participation, ensuring proper communication with fans, and managing event-specific challenges, such as transportation and scheduling, contributed to the higher effort score. This best practice still offered meaningful contributions to sustainability. However, due to the higher implementation effort required compared to local tree-planting programs, it was ultimately not selected as the best practice for Puszcza to pursue under the Carbon Reduction and Neutrality theme.

5.1.3 Best Practice Analysis for Identified Community and Fan Engagement Theme

The methodology applied in this chapter follows the same approach outlined in the previous thematic analyses of renewable energy integration and carbon reduction and neutrality. The following Sankey diagram visualizes the frequency of mentions for the best practices identified within the Community and Fan Engagement theme, providing the foundation for the subsequent decision-making matrix.

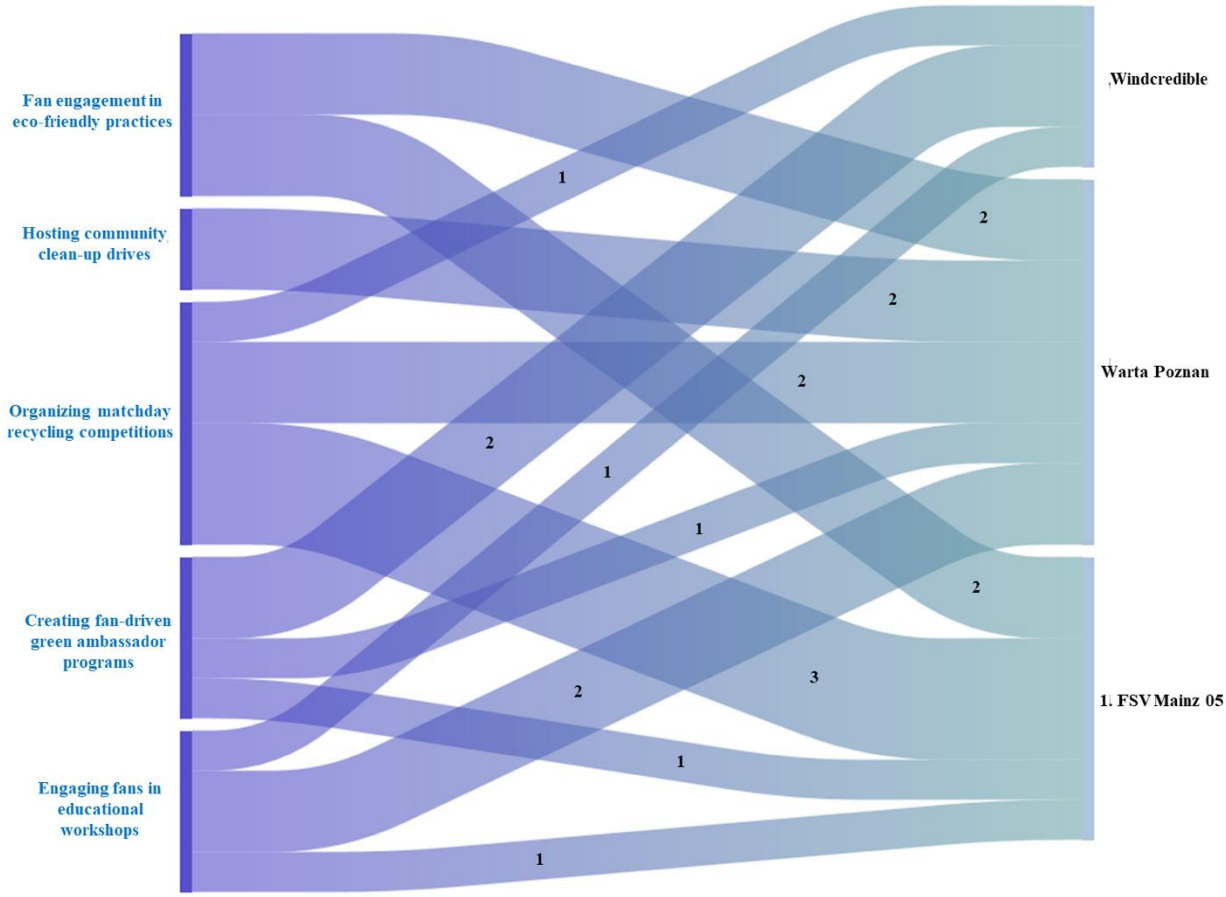

Figure 13 Best Practices Overview for Community and Fan Engagement Theme | Own Creation

	Code	Frequency
Community and Fan Engagement	Fan engagement in eco-friendly practices	4
	Hosting community clean-up drives	2
	Organizing matchday recycling competitions	6
	Creating fan-driven green ambassador programs	4
	Engaging fans in educational workshops	4

Figure 14 Frequencies Overview for Community and Fan Engagement Theme | Own Creation

This above presented initial frequency analysis highlighted organizing matchday recycling competitions as a potential frontrunner for further analysis, with the remaining best practices requiring consideration based on their impact and effort assessments in the decision-making matrix.

Best Practice	Frequency	Impact	Effort	Frequency Score	Implementation Score	Blended Score
Fan engagement in eco-friendly practices	4	7	5	0.67	0.67	0.67
Hosting community clean-up drives	2	6	6	0.33	0.33	0.33
Organizing matchday recycling competitions	6	8	4	1.0	1.0	1.0
Creating fan-driven green ambassador programs	4	6	5	0.67	0.33	0.5
Engaging fans in educational workshops	4	7	5	0.67	0.67	0.67

Figure 15 Implementation Matrix for Community and Fan Engagement Theme | Own Creation

The decision-making matrix for the Community and Fan Engagement theme identified organizing matchday recycling competitions as the most suitable best practice for Puszcza Niepołomice. This practice achieved the highest blended score of 1.0, driven by its high frequency of mentions and favorable impact-to-effort ratio. The implementation score of 1.0 was justified by its moderate effort score of 4, as the competition will involve clean-up rounds during the halftime of matchdays, which requires minimal effort. This approach, derived from a combination of best practices suggested by Mainz and Warta Poznań, directly supports Puszcza's transition towards sustainability by addressing waste management and promoting immediate, actionable recycling behavior among fans. The high impact score of 8 reflects its significant potential to reduce stadium waste and contribute meaningfully to the club's environmental sustainability goals.

In contrast, fan engagement in eco-friendly practices and engaging fans in educational workshops each achieved a blended score of 0.67. These practices shared a medium frequency score of 0.67 and had moderate implementation scores due to their similar effort and impact scores (5 and 7, respectively). The effort score of 5 was justified by the organizational complexity required to implement these practices.

For example, engaging fans in eco-friendly practices would involve creating targeted campaigns, designing materials, and continuously monitoring fan participation, as highlighted by (Krull 2024). Similarly, organizing educational workshops would require careful planning of content, logistics, and participant engagement to ensure meaningful outcomes, according to Cury, Kennelly, and Howes (2022).

The impact score of 7 reflects the meaningful contribution these best practices could make to Puszcza's sustainability transition, particularly in fostering behavioral change and environmental awareness among fans. However, their outcomes are more long-term and less tangible in the immediate operational sustainability of the club. In comparison to Organizing matchday recycling competitions, which directly reduces stadium waste and provides immediate, measurable environmental benefits, these practices were deemed slightly less actionable under the current theme. As a result, while valuable, they did not emerge as the top recommendations for Puszcza to prioritize.

The impact score for creating fan-driven green ambassador programs was 6, which, combined with an effort score of 5, resulted in a blended score of 0.5. The effort score reflected the need for structured training, recruitment, and ongoing management of ambassadors to ensure their alignment with the Puszcza's sustainability objectives, as noted by Casper, Pfahl, and McCullough (2017). Coordinating ambassador activities and measuring their effectiveness also contributed to the moderate effort score. The impact score of 6 was justified by the programs' potential to promote sustainability awareness and encourage eco-friendly behavior among fans, as highlighted by Glebova and Madsen (2024). However, the outcomes are largely educational and long-term, offering limited immediate operational benefits. These factors positioned this practice below others in terms of priority for Puszcza Niepołomice.

6. Conclusion

Puszcza Niepołomice stands at a pivotal moment in aligning its operations with environmental sustainability. The club's unique identity, rooted in its connection to the Niepołomice Forest and its community-focused values, provides a strong foundation for pioneering sustainability in Polish football. As outlined in the literature review, adopting sustainability strategies can enhance branding, community engagement, and environmental impact (Tettamanzi, Grazioli, and Murgolo 2023; Nishida et al. 2024), presenting a clear opportunity for Puszcza to bridge existing gaps in Polish football sustainability practices.

The analysis of the research question identified several feasible strategies, including renewable energy infrastructure, tree-planting initiatives, and matchday recycling competitions. These align with literature emphasizing energy efficiency (Villarino 2021; Bauers et al. 2023) and circular economy principles (Marrucci, Daddi, and Iraldo 2023). Matchday recycling, for example, reduces waste while fostering fan engagement, aligning with growing stakeholder values (Dolles and Söderman 2010; Zülch et al. 2021).

In conclusion, Puszcza Niepołomice has a unique opportunity to lead sustainability efforts in Polish football by implementing practices rooted in academic frameworks. By focusing on energy efficiency, circular economy, and stakeholder engagement, the club can reduce its environmental footprint, improve its competitive position, and strengthen community ties, providing a replicable model for other clubs embarking on sustainability journeys.

7. Recommendations

The primary goal of this thesis is to answer the main research question: *„What strategies can Puszcza Niepołomice adopt to enhance its environmental sustainability by leveraging best practices from other football clubs?”*.

The research question focused on identifying high-impact, low-effort sustainability practices that could be adopted by Puszcza Niepołomice. Three key practices emerged from the analysis: the installation of renewable energy infrastructure at training facilities, the implementation of a "Goal-to-Green" tree-planting initiative, and the organization of matchday recycling competitions. These strategies represent a balance between effort and impact on the club’s sustainability strategy by addressing core environmental challenges while requiring manageable levels of financial and operational investment.

The development of renewable energy infrastructure, such as solar panels, strengthens the club’s green standing and commitment to sustainability while reducing its environmental impact and supporting Puszcza’s sustainability strategy. Similarly, tree-planting programs—such as planting a tree for every goal scored—provide an engaging, low-cost way to visibly contribute to environmental goals as part of a broader sustainability strategy. Such programs have already been successfully established by clubs like Warta Poznań, demonstrating their feasibility and positive impact. Matchday recycling competitions directly address stadium waste and create a tangible, interactive component to sustainability efforts.

The findings revealed significant potential for Puszcza Niepołomice to align its sustainability initiatives with stakeholder interests while addressing its financial and operational challenges. For example, government grants or EU green initiatives could provide critical funding to support high-upfront-cost projects like renewable energy systems or energy-efficient stadium upgrades. Sponsor collaborations, too, represent an opportunity to co-finance

projects such as solar panels or stadium improvements while increasing sponsors' brand visibility through co-branded sustainability campaigns.

To conclude and answer the main research question of the thesis, Puszcza Niepołomice can enhance its environmental sustainability by adopting strategies identified through the analysis of the research question. Three high-impact, low-effort practices emerged: installing renewable energy infrastructure at training facilities, implementing a "Goal-to-Green" tree-planting initiative, and organizing matchday recycling competitions. These strategies address key environmental challenges and align with the club's sustainability goals. These efforts not only advance sustainability but also bring significant benefits in stakeholder engagement, fan loyalty, and sponsorship opportunities. By leveraging funding sources such as government grants, EU green initiatives, and sponsor collaborations, Puszcza can implement these practices effectively while solidifying its position as a sustainability leader in Polish football.

8. Limitations

Key limitations concerning the research question: *"What high-impact, low-effort environmental sustainability practices used by other football clubs can be adapted and implemented by Puszcza Niepołomice?"* included the exclusion of certain themes identified during the analysis due to the 15-page limitation set for the analysis by Nova School of Business & Economics. This restriction meant that some potentially relevant themes and best practices could not be elaborated on in the analysis section.

Another limitation was the reliance on qualitative interviews as the sole primary data source. While the interviews provided valuable insights, they reflect subjective opinions and experiences, which may not fully represent broader trends or generalizable best practices. This reliance on qualitative data introduced a degree of interpretive bias into the thematic analysis.

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10. Appendix

Appendix A: Color-Coded Windcredible Interview

Interview with Filipe Fernandes | Windcredible | 25.11.2024

Caetano

Thank you, Filipe, for taking the time to speak with me. Could you start by introducing yourself and your role at Windcredible?

Filipe

Thank you, Caetano. My name is Filipe Fernandes, and I work at Windcredible, a company specializing in renewable energy with a focus on urban wind turbines. Our turbines are designed to be compact and efficient, suitable for areas like cities or large infrastructure projects where space constraints and aesthetics are important.

At Windcredible, my role is multifaceted. I oversee the development, delivery, and market positioning of our wind turbines. This means ensuring that our technology is not only cutting-edge but also meets the specific needs of our clients. My team and I also focus on building partnerships with organizations that seek innovative renewable energy solutions, which increasingly include football clubs exploring decarbonization strategies.

Although our core product is wind turbines, we've developed strong collaborations with solar energy providers, which allows us to propose hybrid energy solutions when clients are looking for a combination of renewable energy sources. For example, at Benfica, the integration of wind turbines and solar panels was proposed to create a hybrid energy system tailored to their stadium's needs. This approach not only maximizes energy production but also diversifies energy sources to ensure year-round efficiency.

We are also working on a project to explore solar-powered cooling and heating systems for training facilities. These systems could be particularly useful for clubs in warmer climates or those seeking to reduce energy use for temperature regulation. For instance, integrating these systems with renewable energy infrastructure at training facilities could ensure consistent operations even during peak demand periods.

Caetano

Who are your typical clients, and what services does Windcredible provide?

Filipe

Our clients come from diverse sectors, but they all share a common goal: achieving energy independence and sustainability. These include utility companies, solar installers, large enterprises, and organizations with significant infrastructure needs.

For football clubs, which are now starting to seriously consider renewable energy, our primary role has been exploratory. For instance, we've had early discussions with FC Porto to assess the feasibility of installing wind turbines on their training facilities and potentially their stadium.

We've also explored solar-powered cooling and heating systems for clubs. These systems are particularly effective for facilities like training centers, which have a high demand for temperature regulation. Combining these systems with renewable energy infrastructure at training facilities creates an efficient and scalable approach.

At Porto, the idea of involving green ambassadors has been floated as part of their broader community engagement. These programs could help bridge sustainability projects with local fans and stakeholders.

Caetano

What has been your experience with implementing renewable energy solutions specifically for football stadiums?

Filipe

Football stadiums present unique challenges and opportunities for renewable energy. Our work with Benfica, for example, involved assessing the potential for wind turbines and recommending how they could complement solar panels. The aim was to maximize energy production while minimizing disruptions to the stadium's operations.

At FC Porto, a phased approach to renewable energy is under consideration, starting with building renewable infrastructure for training facilities. This allows the club to test systems on a smaller scale, such as solar panels combined with energy-efficient lighting, before rolling them out to larger venues.

Caetano

Since Windcredible specializes in wind turbines but collaborates with solar providers, could you elaborate on the role of solar panels for football clubs?

Filipe

Absolutely. Solar panels are an excellent renewable energy solution for football clubs, particularly because of the large, open spaces that stadiums provide. They are ideal for solar panels due to their size and exposure to sunlight. For instance, a mid-sized stadium roof with a solar capacity of 500 kW to 1 MW can generate enough electricity to power all stadium operations on non-match days and significantly reduce energy usage during matches.

Taking this one step further, when combined with wind turbines, solar panels provide a complementary energy source.

Caetano

What challenges do football clubs face in adopting renewable energy, and how can these be addressed?

Filipe

Yeah, so, again, the cost. Renewable energy systems require significant upfront investment. However, you can spread costs over several years, apply for government grants, and utilize EU funding. For example, training facilities are an ideal starting point for clubs like Puszcza, as they require smaller investments and yield immediate benefits.

Another critical step is conducting carbon audits to identify high-emission areas within the club's operations. These audits provide a clear roadmap for reducing emissions by targeting inefficiencies, such as outdated lighting systems or high-energy-consuming HVAC equipment. Implementing renewable energy systems after such audits ensures that clubs address the most impactful areas first.

Zero carbon mobility initiatives also present a great opportunity for reducing emissions, same goes for tree planting to offset emissions. For instance, clubs could encourage fans to use public transportation, provide bicycle parking at stadiums, or partner with electric vehicle services on matchdays. These efforts not only cut down transportation-related emissions but also align with broader sustainability goals.

Caetano

Do you see renewable energy becoming a standard for football clubs?

Filipe

Without a doubt. Rising energy costs and regulatory pressure make renewable energy an inevitability. In Poland, the EU's Green Deal and growing public awareness will drive adoption. Clubs that act now can secure subsidies and gain a competitive edge as sustainability leaders.

Caetano

What are some initiatives clubs could consider beyond renewable energy systems?

Filipe

In addition to energy systems, clubs could host matchday recycling competitions, where fans are incentivized to recycle waste during games. These competitions engage fans while addressing stadium waste management.

Another idea is creating fan-driven green ambassador programs. These programs enable fans to actively participate in sustainability efforts, such as promoting recycling or organizing local clean-up events. We've seen this work well in community-driven organizations. Clubs can also engage fans in schooling them on topics like renewable energy and waste management to foster a deeper understanding of sustainability.

Caetano

Thank you for these valuable insights, Filipe.

Filipe

It's been my pleasure. Let me know if you need further assistance.

Appendix B: Color-Coded Warta Poznan Interview

Interview with Jarosław Żubka | Warta Poznań | 28.11.2024

Caetano

Jarek, thank you for agreeing to this interview. To begin, could you introduce yourself and explain your role at Warta Poznań? I'd also appreciate it if you could provide some background on the club's sustainability initiatives and how they've evolved over the years.

Jarek

Thank you for having me. My name is Jarosław Żubka, and I am the sustainability and image officer at Warta Poznań. My responsibilities are twofold: first, I lead the development and implementation of our Environmental, Social, and Governance (ESG) strategy, and second, I manage the club's broader branding and community relationships.

Warta Poznań holds a unique position in Polish football. As one of the smaller clubs, we often face resource constraints, which has driven us to think creatively about how we operate. Sustainability has become a core part of our identity—not just as a tactical advantage but as a long-term vision for the club.

In 2024, we became the first sports club in Poland to formally adopt a comprehensive ESG strategy. This marked a significant shift, as sustainability moved from being a series of isolated initiatives to becoming a guiding framework for everything we do. It's a challenging journey, but we see it as essential for creating a meaningful impact in the football community and beyond.

Caetano

That's inspiring! Could you tell me more about how the idea of integrating ESG into Warta Poznań originated? Was it driven by external trends, internal leadership, or a combination of factors?

Jarek

The journey began in 2020 with a change in ownership. The new leadership team recognized the need to differentiate Warta Poznań in the competitive football landscape. Unlike larger clubs like Lech Poznań, we don't have the financial muscle or massive fan base to rely on. Instead, we needed to carve out a distinct identity that aligned with broader societal values.

At first, the approach was largely image-driven. We're nicknamed "The Greens," so it felt natural to associate the club with ecological values. But as we delved deeper, we saw that sustainability could be much more than a marketing strategy—it could reshape how we operated as a club. For instance, one of the areas we began exploring was building renewable infrastructure for training facilities and zero carbon mobility, which offered us a manageable and impactful starting point for energy transitions.

For example, one of our first initiatives under the new leadership was the creation of football sections for amputee and blind players. This demonstrated our commitment to inclusion and community engagement, which later became pillars of our ESG strategy. Over time, we expanded these efforts to include environmental goals, such as feasibility assessments for renewable energy in football stadiums or local tree planting initiatives to identify opportunities for green energy implementation.

Caetano

Could you elaborate on some of the sustainability initiatives that Warta Poznań has implemented? Specifically, what would you consider your top three achievements in this area?

Jarek

Certainly. Sustainability is a broad field, but I'd highlight the following three initiatives as our most impactful:

In 2022, we conducted a comprehensive ecological audit to measure our carbon footprint. This included everything from energy consumption in our facilities to transportation-related emissions. Based on the findings, we developed a detailed plan to reduce emissions, focusing on areas like renewable energy, waste management, and fan travel where we target zero carbon mobility. While it's an ongoing process, this audit has been instrumental in setting clear, measurable goals.

One of the unique challenges we face is that our home matches are held in a location 50 kilometers from Poznań. To address the environmental impact of fan travel, we partnered with local public transport providers to encourage the use of buses and trains. This initiative aligns with our broader goal of promoting zero carbon mobility, ensuring fans have eco-friendly ways to attend matches.

We also have a tree planting initiative for every goal scored by Warta Poznań, we plant one tree. This initiative began as a symbolic gesture but quickly gained traction, with over 8,000 trees planted so far. To enhance its impact, we've also introduced programs for promoting fan participation in tree planting events. Fans, players, and community groups collaborate on planting days, fostering a collective sense of environmental responsibility. Additionally, our tree planting programs have expanded to include school partnerships, where we involve students in creating greener spaces.

In addition to these initiatives, we've also started integrating wind turbines and solar panels into our sustainability planning. These solutions are being considered for both matchday operations and building renewable infrastructure for the stadium and training areas to reduce our reliance on traditional energy sources. We even thought about carbon neutral matchdays, this is however a look in the far future as its currently not our top priority.

Caetano

These initiatives sound fantastic, but they must require significant financial resources. How does Warta Poznań manage to fund these projects, especially given the financial pressures smaller clubs often face?

Jarek

You're absolutely right—financial constraints are a constant challenge. Our approach has been to leverage partnerships and align our sustainability goals with the interests of our sponsors. For instance, we've collaborated with the Polish National Forests organization on the tree-planting initiative. They provide the land and expertise, which significantly reduces our costs.

Additionally, we've attracted sponsors specifically interested in ESG projects. These are often companies looking to enhance their own sustainability credentials. By partnering with Warta Poznań, they can demonstrate their commitment to environmental and social causes while supporting our initiatives.

For example, a major Polish energy company sponsors our academy and ESG projects, helping us implement renewable energy infrastructure at training areas and educational programs. This symbiotic relationship has been crucial in sustaining our efforts.

Caetano

How have fans responded to your sustainability efforts? Have you noticed differences in engagement across age groups?

Jarek

Yes, fan engagement has been one of the most rewarding aspects of our sustainability journey. Younger fans, especially those in their 20s, are very enthusiastic about environmental initiatives. They view these efforts as an extension of their own values and are eager to participate in activities like promoting fan participation in tree planting programs.

Older fans, however, tend to focus more on the team's performance on the pitch. I don't see them participating in classes about this topic. For them, sustainability is secondary to sports results. That said, we've found ways to bridge this gap by framing sustainability as a means of strengthening the club's future, as argued in the use of wind turbines and solar panels into our broader energy strategy.

Caetano

Sustainability also includes waste management and circular economy practices. How has Warta Poznań addressed these areas? What about recycling competitions?

Jarek

We've made some progress, but this remains an area where we need improvement, since we have mainly focused on promoting the fan participation in tree planting. Initially, we launched a plastic reduction initiative, replacing single-use plastics with biodegradable alternatives in our facilities. However, operational challenges, particularly within our academy, have limited the program's scope. We have also considered clean up drives among the facility, but the organizational effort was too high for these clean up drives.

One of the main obstacles has been the lack of dedicated personnel to oversee these initiatives. As a smaller club, our resources are stretched thin, and sustainability often competes with other priorities. Despite these challenges, we're committed to reviving and expanding our circular economy practices in the near future. As for the recycling practice, I like this idea actually, we have no matchday recycling rounds, so that might even be something worth considering.

Caetano

Looking ahead, what are Warta Poznań's sustainability goals? I understand a new stadium is part of the plan—how will it align with your ESG strategy?

Jarek

Our vision for the new stadium goes beyond sports. We want it to serve as a hub for environmental education and community engagement. For example, one of the stands will include an ecological education center, where visitors can learn about sustainability practices.

Financing remains a challenge. The project will rely on a mix of funding from the City Hall, private investors, and the club itself. Due to our recent relegation, we've had to delay the timeline, but we're committed to realizing this vision. In the meantime, we're focusing on maintaining our current facilities and implementing smaller-scale sustainability projects.

Caetano

Thank you for sharing such valuable insights. As a final question, what advice would you offer to Puszcza Niepołomice as they embark on their own sustainability journey?

Jarek

My advice would be to start with realistic, high-impact initiatives that require minimal financial investment. For example, conducting a carbon audit or launching community-driven projects like tree planting can create momentum without straining resources.

Engaging stakeholders—fans, sponsors, and local authorities—is equally important. Sustainability is not a solo effort; it's a shared responsibility. By building strong partnerships and involving the community, Puszcza can amplify its impact and position itself as a leader in Polish football sustainability.

Caetano

That's excellent advice, Jarek. Thank you again for your time and insights. This has been incredibly helpful for our project.

Appendix C: Color-Coded 1. FSV Mainz 05 Interview

Interview with Sustainability Expert | 1. FSV Mainz 05 | 13.11.2024

Caetano

Thank you, for taking the time to discuss sustainability efforts at Mainz 05. Could you start by introducing yourself and your role within the club?

Sustainability Expert

Of course, and thank you for having me. I'm Sustainability Expert, part of the sustainability team at Mainz 05. My work focuses on embedding sustainability across all levels of the club, from operations to community engagement.

This involves managing various environmental initiatives, such as carbon audits to identify emission hotspots and target reductions. We've also implemented measures such as waste management, energy efficiency upgrades, and renewable energy solutions. Equally important is our social responsibility work, which we coordinate through "Mainz 05 hilft e.V."—a foundation dedicated to ecological and social projects. Our efforts span everything from providing flood relief to educational outreach and partnerships with local communities.

Internally, we also have dedicated stakeholder engagement bodies that work closely with supporters to promote sustainability initiatives, ensuring stakeholders feel directly involved in the club's environmental efforts.

My role bridges the technical and human aspects of sustainability: aligning operational improvements with stakeholder collaboration to ensure these efforts resonate with fans, employees, and sponsors.

Caetano

How did sustainability become such a central focus for Mainz 05? Was this shift driven internally, externally, or both?

Sustainability Expert

Sustainability has always been part of Mainz 05's DNA, though the way we approach it has evolved. Initially, our focus was on social responsibility, ensuring the club contributed to the well-being of the local community. Over the years, we recognized how closely this ties to environmental sustainability, especially as public awareness of climate change has grown.

Internally, the shift was championed by leadership who saw the long-term value—not just for the planet, but also for the club's financial health and reputation. Externally, fan expectations and societal trends also played a significant role. Soccer clubs wield significant influence, and we believe it's our responsibility to lead by example. By making sustainability integral to our operations, we're able to amplify awareness and action on these issues, both locally and globally.

Caetano

Could you provide concrete examples of the sustainability measures Mainz 05 has implemented?

Sustainability Expert

Certainly. As for recycling and waste management, we installed clearly marked recycling stations throughout the stadium, accompanied by an awareness campaign to educate fans about proper waste separation. This initiative reduced residual waste by over 30% per match day and significantly improved recycling rates. Clear communication and accessible infrastructure are critical for behavior change. This is a relatively low-cost but high-impact measure that other clubs could adopt immediately.

Then we also looked into plastic reduction initiatives and on the basis of this, we phased out single use plastics from all catering operations and replaced with biodegradable alternatives, including compostable utensils and cups. The main challenge there was ensuring a consistent supply of biodegradable materials was initially difficult and required collaboration with suppliers. This move drastically cut plastic waste and demonstrated our commitment to sustainability to fans and sponsors.

We've also focused on building renewable infrastructure for training facilities, such as energy-efficient lighting and small-scale solar installations, as well as low carbon mobility solutions for away games. This approach has allowed us to test renewable energy solutions on a smaller scale before expanding to larger venues like the stadium. For example, we're conducting feasibility assessments for renewable energy in football stadiums to better understand how wind and solar solutions could be integrated into our operations. With regards to mobility, we coordinate shuttle services, paid by fans for away games to offset emissions as well.

We look into exploring the integration of wind turbines and solar panels as a hybrid solution to maximize renewable energy production. This combined approach could significantly reduce the reliance on external energy sources, especially during peak operational times.

We're also committed to tree-planting programs, with initiatives such as planting trees for tickets sold. This allows us to offset some of the carbon emissions from matchday activities while directly engaging with local environmental efforts. Another program involves working with schools and community groups to organize tree-planting projects, further embedding the club's commitment to long-term sustainability goals.

Caetano

What challenges have you faced in making sustainability part of the club's day-to-day activities?

Sustainability Expert

Integrating sustainability into the fabric of a soccer club is no small task. We've faced three main challenges. First, we had financial pressures as many sustainability initiatives, especially infrastructure upgrades like renewable energy systems, require substantial upfront investment. This often competes with other budgetary priorities, such as player development and stadium maintenance.

Additionally, implementing renewable energy at facilities required feasibility assessments for renewable energy in football stadiums, as these initiatives need to be tailored to the club's unique needs. For instance, the structural and geographic specifics of a stadium can influence the effectiveness of wind and solar installations.

Finally, we had to address operational complexity. Building renewable infrastructure for training facilities posed logistical challenges but also served as a testing ground for broader sustainability measures. These smaller projects allowed us to gain insights and refine our approach before scaling them to larger venues like the stadium.

Caetano

Based on your experience, what best practices would you recommend for other clubs, especially smaller ones, aiming to enhance sustainability?

Sustainability Expert

Since you have mentioned low-cost, high-impact implementations, I'd suggest that you do the following. Start with initiatives that require minimal investment but deliver visible results, such as tree-planting programs or recycling initiatives. These build momentum and demonstrate commitment.

Engage fans directly through initiatives such as promoting participation in tree-planting events. This can involve organizing community tree-planting drives or partnerships with local environmental organizations. Another approach is linking these programs to matchday events to generate greater visibility and participation.

Remember that sustainability should always be a shared journey. Educating fans through campaigns or involving them in activities, such as community clean-ups or tree planting, fosters a sense of ownership and support, it at least has so for us at Mainz.

Here at Mainz, but also at other Bundesliga clubs, you can see that metrics are being used to track progress, such as waste reduction percentages or carbon footprint changes. Sharing these results builds trust and accountability while inspiring others to act.

Large projects, such as the integration of wind turbines and solar panels and low carbon matchdays, can be phased over several years to distribute costs while maintaining a clear move toward renewable sustainability. For instance, building renewable infrastructure for training facilities before expanding to stadium-level projects allows smaller clubs to take manageable steps toward achieving sustainability goals.

Caetano

How has Mainz 05 approached renewable energy integration, and what are your plans for the future?

Sustainability Expert

We've already made strides by upgrading to energy-efficient systems, such as LED lighting and modern heating solutions. A portion of our electricity is sourced from renewable providers, which aligns with our carbon reduction goals.

This would be a significant step, both symbolically and operationally. We also want to further leverage our tree initiatives and also engaging stakeholders with the. The panels could cover a substantial portion of our energy needs, reducing emissions while lowering costs.

The main challenge remains securing funding, but we're exploring government grants and partnerships with green energy companies to make this feasible.

Caetano

What strategies can clubs use to manage the costs of sustainability initiatives?

Sustainability Expert

Managing costs requires creativity and resourcefulness. What worked for us was making use of the funding opportunities that are offered by the EU. The EU and national grants often support green infrastructure projects, such as renewable energy installations. Clubs should explore these opportunities.

I would also consider partnerships. Many companies are eager to align with environmentally responsible organizations. By partnering with sustainability-focused sponsors, we've reduced the financial burden of major projects.

And especially for PV system projects might have high initial costs but generate significant savings over time, as the energy provided is cheaper. These savings can then be reinvested into future initiatives.

Caetano

Are fans increasingly supportive of sustainability efforts? How does this vary between Germany and other regions?

Sustainability Expert

Absolutely. German fans, in particular, place high value on sustainability. Many expect their clubs to act responsibly, which has made it easier for us to gain support for initiatives like waste reduction, carbon offsetting and renewable energy, which is mostly due to us really engaging with them.

Internationally, the level of awareness varies. Countries with strong national sustainability policies—like Scandinavia and the UK—tend to have more engaged fan bases. However, even in less proactive regions, we're seeing growing interest as climate issues gain global attention.

Caetano

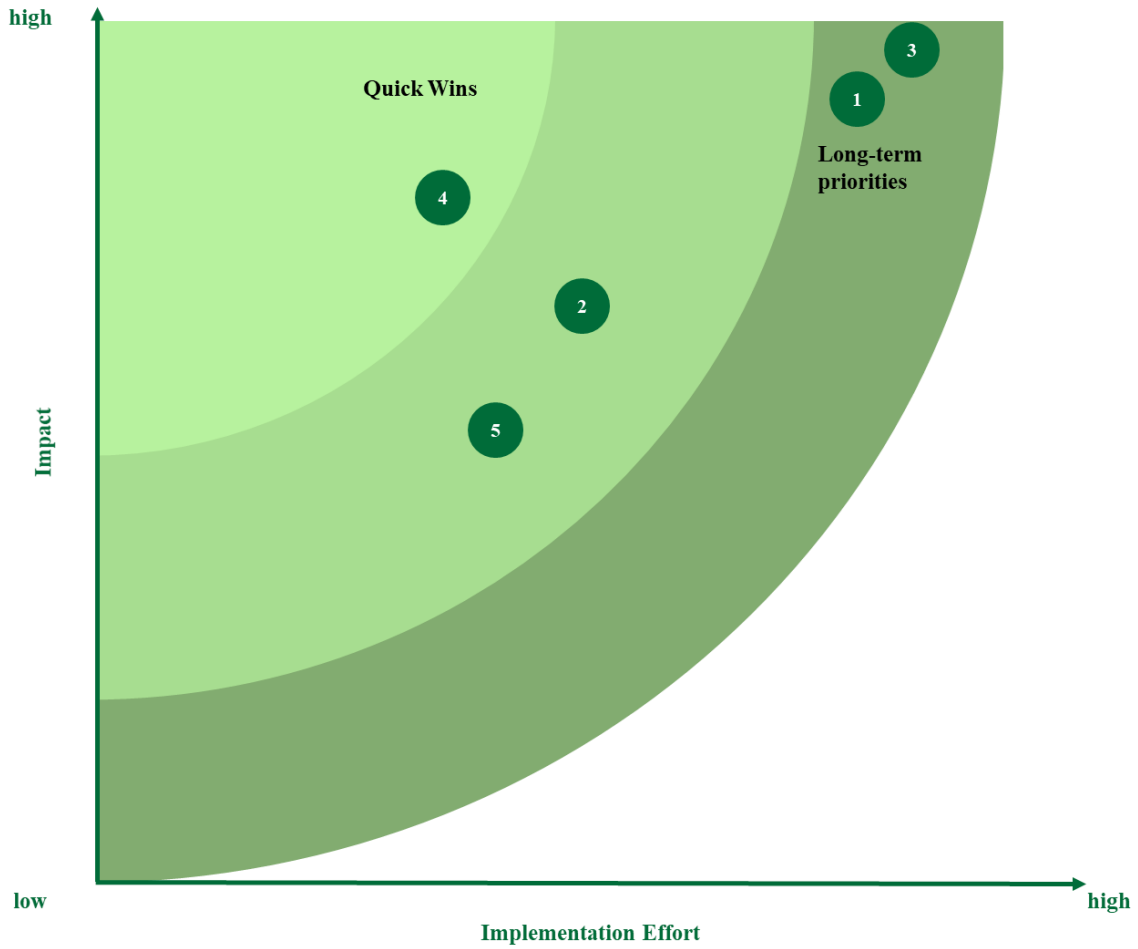
Thank you. To wrap up, what advice would you give clubs starting their sustainability journeys?

Sustainability Expert

Engage all stakeholders—fans, employees, and sponsors—because sustainability is a shared responsibility. Most importantly, view sustainability as a long-term commitment rather than a one-time project. It's not just the right thing to do; it's an opportunity to future-proof your club and its operations.

Appendix D: Implementation Score Deepdive (Implementation Matrix)

Renewable Energy Integration Theme



1: Hybrid energy solutions for high efficiency

2: Exploring solar-powered cooling and heating systems

3: Integration of wind turbines and solar panels

4: Building renewable infrastructure for training facilities

5: Feasibility assessments for renewable energy in football stadiums

1. Hybrid Energy Solutions for High Efficiency | Rating Justification

The placement of hybrid energy solutions for high efficiency in the implementation matrix reflects its high impact and relatively high implementation effort. This practice was assigned an impact score of 8 because hybrid systems, which combine renewable energy sources such as wind and solar, provide substantial sustainability benefits by enhancing energy efficiency and reducing carbon emissions. The ability of these systems to generate reliable, clean energy while decreasing reliance on traditional energy grids underscores their high environmental value.

Studies such as those by Vargas (1990) have highlighted the significant long-term emissions reductions enabled by hybrid energy systems, reinforcing their high-impact potential. However, implementing these systems requires considerable resources, advanced technology, and skilled expertise (Lagorse et al. 2008). The complexity involved in integrating multiple energy sources into existing infrastructure necessitates substantial financial investment and planning. For a smaller club like Puszcza Niepołomice, these factors present a challenge, which justifies the assignment of an effort score of 7, reflecting the relatively high difficulty of implementation.

2. Exploring Solar-Powered Cooling and Heating Systems | Rating Justification

Exploring solar-powered cooling and heating systems was positioned in the implementation matrix with a medium effort score of 6 and a medium-high impact score of 7. These systems directly reduce energy consumption by addressing the specific operational demands of buildings such as stadium facilities and training centers. The localized benefits, including a reduction in electricity demand and greenhouse gas emissions, contribute to their notable environmental value (Schmidt et al. 2015).

The moderate effort score reflects the technical expertise and upfront costs required to implement these systems, as well as the need for scalable integration with existing infrastructure at the club (Reina et al. 2024).

3. Integration of Wind Turbines and Solar Panels | Rating Justification

The integration of wind turbines and solar panels was placed in the high-effort and very high-impact quadrant of the implementation matrix. This practice earned an impact score of 9 due to its transformative potential to generate large-scale renewable energy. By reducing reliance on fossil fuels and minimizing carbon emissions, this practice aligns with UEFA's sustainability goals and directly supports the achievement of carbon neutrality, as emphasized by Chen (2013) and Uva (2021). The deployment of both wind turbines and solar panels represents a comprehensive approach to renewable energy, making it one of the most impactful practices within the Renewable Energy Integration theme.

However, the high implementation effort reflects the substantial resources and planning required. This includes significant financial investment, complex infrastructure changes, and regulatory compliance, as well as the need for environmental assessments and land use planning (Rao 2019; Gebreslassie 2020). These challenges result in an effort score of 8, underscoring the resource-intensive nature of this practice.

4. Building Renewable Infrastructure for Training Facilities | Rating Justification

Building renewable infrastructure for training facilities stands out as a low-effort, high-impact practice, earning it a place in the "Quick Wins" quadrant of the implementation matrix. The impact score of 9 reflects the significant sustainability benefits this practice can achieve.

Implementing renewable technologies, such as solar panels in training facilities reduces will positively enhance the club's green image.

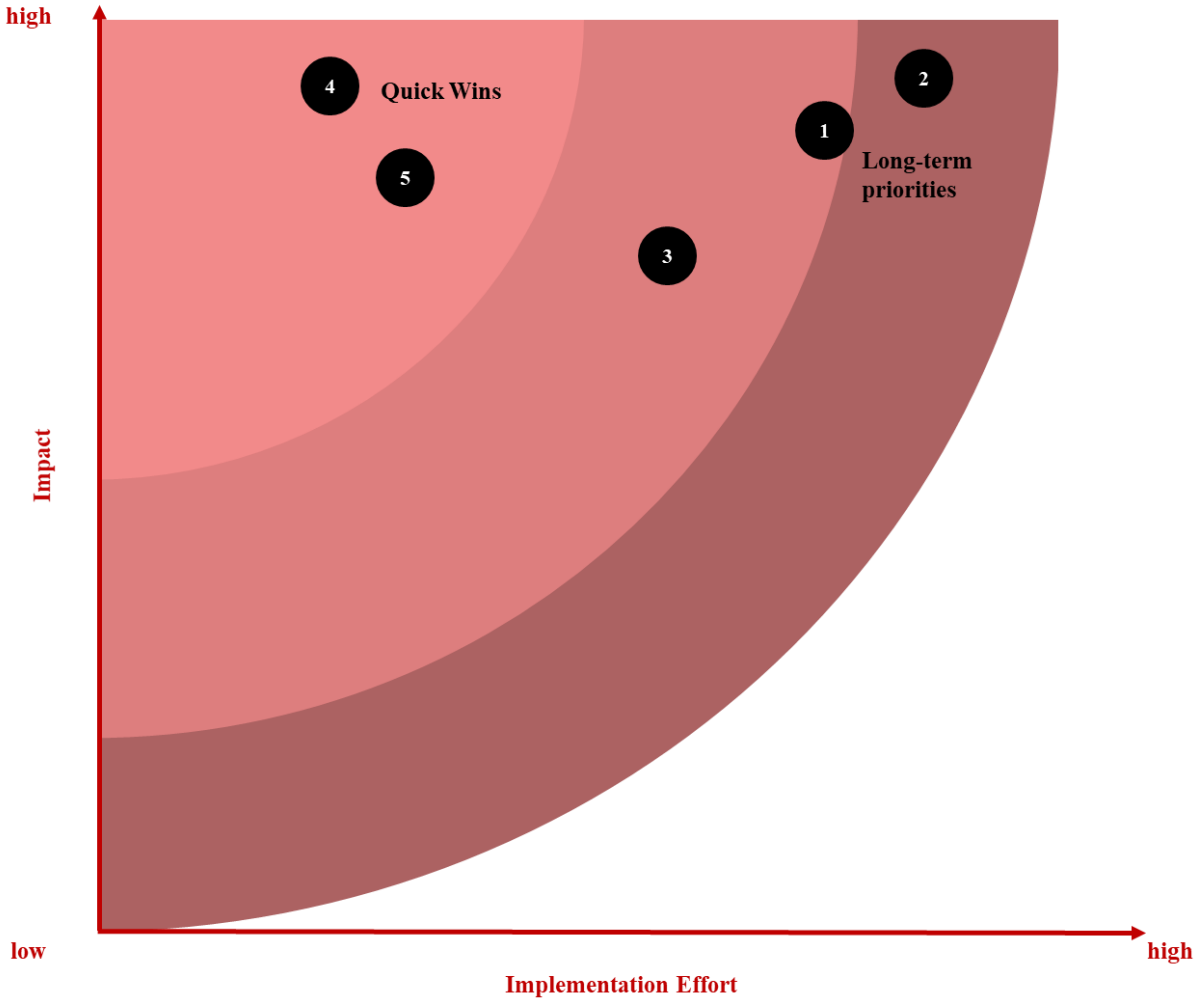
Training facilities provide a controlled environment where these technologies can be deployed effectively, resulting in tangible environmental gains. According to Chen (2013), such localized efforts have a substantial effect on a club's sustainability profile and public perception. The effort score of 4 reflects the relatively low complexity of implementing renewable infrastructure at smaller-scale facilities compared to full stadium integration, making this practice both feasible and impactful for Puszcza Niepołomice (Khanna et al. 2024).

5. Feasibility Assessments for Renewable Energy in Football Stadiums | Rating Justification

Feasibility assessments for renewable energy in football stadiums were positioned in the low-effort, medium-impact quadrant of the implementation matrix. This practice earned an impact score of 6 because it serves as an essential preparatory step for larger renewable energy projects (Stahl et al. 2022). While feasibility assessments do not directly reduce emissions or improve sustainability outcomes, they enable informed decision-making and enhance the likelihood of success for future initiatives. This foundational value justifies the assignment of a medium impact score.

The effort score of 3 reflects the relatively low complexity of conducting these assessments. They primarily require expertise in energy systems analysis rather than extensive infrastructure or financial investment. As such, feasibility assessments are an accessible starting point for Puszcza Niepołomice, allowing the club to explore its renewable energy options with minimal resource commitments.

Carbon Reduction and Neutrality Theme



1: Carbon audits and emissions reduction

2: Zero carbon mobility

3: Hosting carbon-neutral match days through offset programs

4: Local tree-planting programs

5: Promoting fan participation in tree-planting events

1. Carbon Audits and Emissions Reduction | Rating Justification

The moderate impact stems from the practice's ability to provide a detailed understanding of the club's emissions. For Puszcza Niepołomice, this practice establishes a strong foundation for future sustainability efforts by identifying specific areas for improvement.

However, the high effort score reflects the technical expertise and resources required to carry out comprehensive audits and analyze the data effectively, which may strain the club's current capabilities (Ferenc and Váry 2023).

2. Zero Carbon Mobiity | Rating Justification

The impact of this best practice reflects the significant reduction in transportation-related emissions, a key contributor to a football club's overall carbon footprint, according to Loewen and Wicker (2021), respectively. For Puszcza Niepołomice, implementing zero carbon mobility initiatives, such as green transport options for fans, aligns well with long-term sustainability goals.

The medium-high implementation effort score accounts for the logistical complexity and infrastructure changes required to implement such a system, making it a challenging best practice to pursue.

3. Hosting Carbon-Neutral Match Days through Offset Programs | Rating Justification

The medium-high impact reflects the practice's ability to engage fans and showcase the club's environmental commitment while offsetting emissions associated with large events. For Puszcza Niepołomice, this initiative could elevate its environmental profile.

The medium effort score reflects the work required to accurately calculate emissions and establish partnerships with reliable carbon offset providers, which is manageable but still resource and time intensive, according to Ramsay (2021).

4. Local Tree Planting Programs | Rating Justification

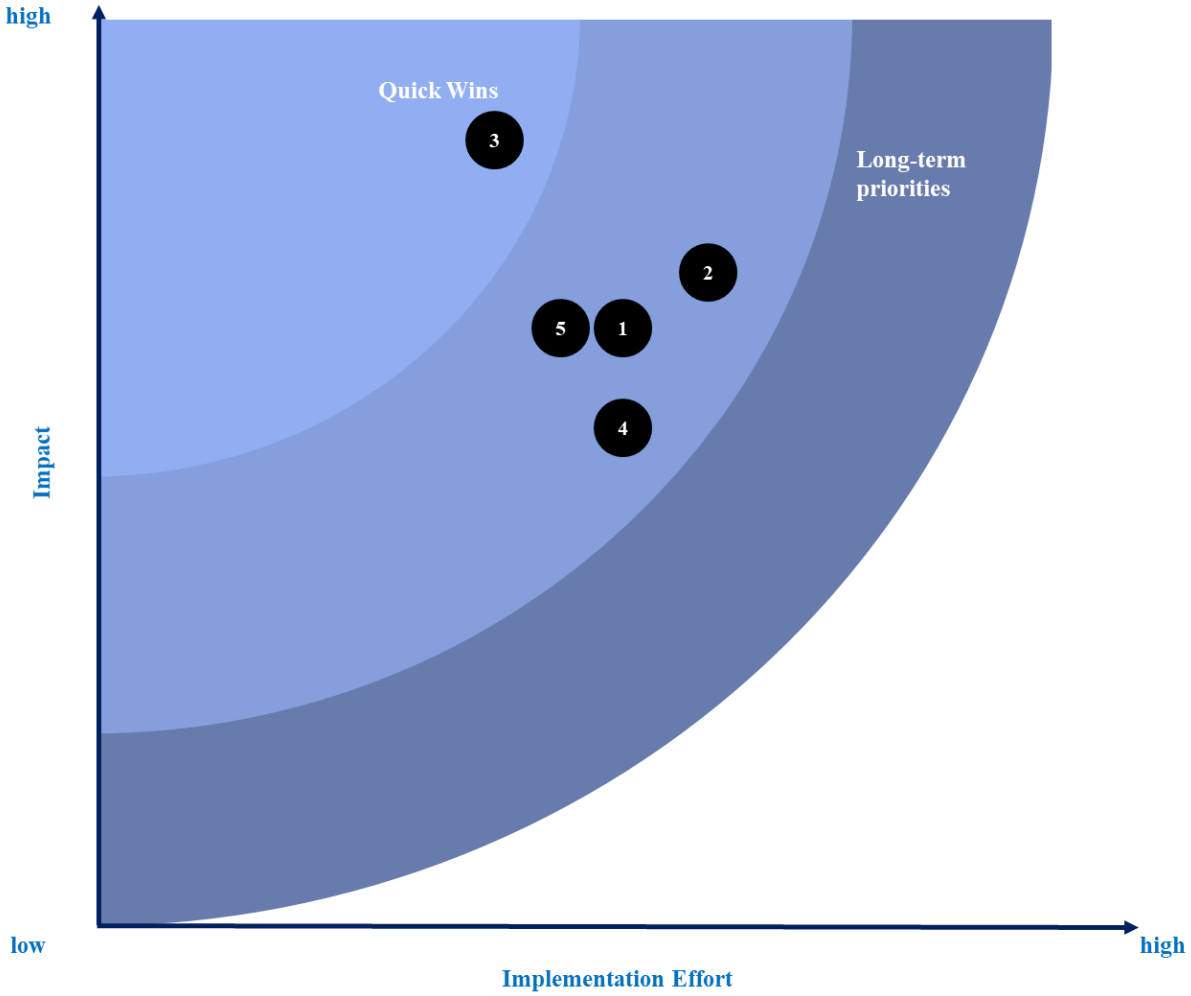
This practice received a high impact score because tree planting contributes directly to carbon offsetting while also engaging the community reflecting Puszcza's forest-based heritage. Additionally, this practice offers both environmental and social benefits, reinforcing the club's identity as a community-oriented club, as outlined by Marek Cebula, the club representative.

The low effort score reflects the relative simplicity of organizing tree-planting events, particularly with community or partner support, making it highly feasible.

5. Promoting Fan Participation in Tree Planting Events | Rating Justification

The engagement factor focuses on the club's value by fostering a sense of environmental responsibility among fans. The slightly higher implementation effort score, compared to the local tree planting best practice, reflects the logistical coordination required to involve fans meaningfully in such initiatives.

Carbon Reduction and Neutrality Theme



1: Fan engagement in eco-friendly practices

2: Hosting community clean-up drives

3: Organizing matchday recycling competitions

4: Creating fan-driven green ambassador programs

5: Engaging fans in educational workshops

1. Fan Engagement in Eco-Friendly Practices | Rating Justification

This rating reflects the practice's ability to foster meaningful participation among fans in sustainability initiatives, which aligns with Puszcza Niepołomice's community-centered identity. The implementation effort score was set at 5 due to the promoting recycling behaviors efforts. The impact score of 7 reflects its potential to enhance environmental awareness and influence fan behavior positively, contributing to the club's broader sustainability goals (Baldwin 2023).

2. Hosting Community Clean-Up Drives | Rating Justification

The implementation effort score accounts for the resources needed to organize clean-up events and ensuring proper disposal of collected waste, whereas the impact score of 6 reflects the practice's limited but tangible environmental benefits, which, for Puszcza Niepołomice, could also be utilized to enhance the club's branding (Samuel et al. 2022).

However, there are other best practices under this theme that have a higher impact and greater potential for lowernig carbon reduction while bearing in mind that Puscza Niepołomice is a community-oriented club.

3. Organizing Matchday Recycling Competitions | Rating Justification

The low effort score reflects the straightforward nature of this practice, which involves promoting the competition to fans and providing small incentives for participation. Its high impact score of 8 is attributed to its visibility during matchdays, where it can directly engage large numbers of fans in eco-friendly behaviors, therby ultimately contributing to carbon offsetting (Oo et al. 2024). This practice not only promotes immediate action but also reinforces long-term sustainability habits, making it particularly well-suited for Puszcza Niepołomice.

4. Creating Fan-Driven Green Ambassador Programs | Rating Justification

The implementation effort score reflects the work required to recruit and train ambassadors, as well as to design programs that align with the Puszcas sustainability objectives, which the club has not yet ultimately laid out, according to the club representative, respectively.

While the impact of this practice is meaningful, other best practices, with higher environmental impact, have been the key are of focus wihtin this implementaion matrix.

5. Engaging Fans in Educational Workshops | Rating Justification

The effort score considers the organizational requirements for hosting workshops, such as developing content and inviting adequate speakers. The high impact score reflects the long-term benefits of educating fans, which include fostering a deeper understanding of environmental issues and inspiring sustained behavioral changes. This practice aligns closely with Puszcza Niepołomice’s goal of strengthening its connection with the community while simultaneously undergoing a green transition.