A Work Project, presented as part of the requirements for the Award of a Master's degree from the Nova School of Business and Economics.

HOW CLIMATE CHANGE AND ENVIRONMENTAL DISASTERS AFFECT GRASSROOTS FOOTBALL CLUBS, AND IMPACTS THE COMMUNITIES IN EUROPE? - THE ECONOMIC IMPACTS OF CLIMATE CHANGE ON GRASSROOTS FOOTBALL CLUBS - GERMANY CASE STUDY

ZICHEN WANG (58640)

Work project carried out under the supervision of:

Inês Caetano

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Abstract

This thesis examines the impact of climate change on grassroots football clubs in Europe, focusing on France, Germany and Italy. The individual thesis mainly focus on the economic impact on grassroots football club. Grassroots football, which is vital for community identity and cohesion, faces challenges from rising temperatures, flooding and financial pressures. These disruptions affect infrastructure, participation and sustainability, with wider implications for mental health, social ties and economic. Case studies highlight adaptation measures and their effectiveness in building resilience. The research calls for stronger policies, innovative solutions and stakeholder collaboration to mitigate climate risks and preserve the social and economic benefits of grassroots football. In group thesis, my primary contributions include the literature review, the section on the social impact of grassroots football, as well as my individual analysis, economic impact. Additionally, I actively participated in the writing of the conclusion and recommendations, limitations and future research. While some content I worked on could not be seamlessly integrated into my final individual section, such as detailed analyses and discussions, these were included in the group thesis as a whole. The full scope of my contributions is therefore reflected in the collective work, showcasing a comprehensive understanding of the subject matter.

Keywords: Grassroots Football, Climate Change, Environmental disasters, Adaptation, Impact, Feasibility, Economic Impacts.

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1. Introduction

1.1 Common Goal

Working closely with *Common Goal*, for the thesis on grassroots football. Founded on August 4th, 2017, *Common Goal* is a pledge-based charitable movement by streetfootballworld for the football industry, launched with the public support of Spanish footballer Juan Mata. Common Goal is rooted in the belief that the world's most popular sport is one of the few cultural forces strong enough to help shift society toward a more sustainable and equitable future for all. By encouraging football players, coaches, and clubs to pledge at least 1% of their salaries or revenues to social projects, they aim to maximize the game's contribution to people and the planet (Common Goal 2024).

The initiative seeks to create lasting connections between football as a business and football as a catalyst for social transformation. The organization addresses global challenges such as inequality, education, and climate action by leveraging the sport's influence and reach. This connection between football and broader social causes underscores the importance of investigating how climate change affects grassroots football, as these impacts threaten not only the sport itself but also the potential for achieving positive community and global outcomes through football (Common Goal 2024).

Common Goal aims to inspire everyone in football to collaborate towards an equal and sustainable future for all. To do so, they unite organizations, athletes, clubs, brands and other stakeholders in football to drive progress towards the Global Goals (United Nations Sustainable Development Goals). Some of the key impacts' areas are anti-racism, gender equality, LGBTQ+ inclusion, youth health and employability and peace building. To drive these positive changes in the world, they are working closely with partners such as football institutions, private companies, governmental bodies, and foundations. These partnerships are tailored to create shared value and sustainable impact (Common Goal 2024). Some examples

of sponsors and partners are Adidas, Right to Dream, EU Commission, FIFA Foundation and many more.

With help of their connections in this sector, the online papers published and our own research, we aim to offer great insights on how climate change and environmental disaster are affecting grassroots football and why it is so important to respond to it. We will now give a brief description of what grassroots football is, so that it is easier to follow and understand as we move forward in our thesis.

1.2. Grassroots Football

It is essential that we clarify the primary topic of discussion: grassroots football. According to the *UEFA*, grassroots football is defined as the amateur level of the sport, played by everyone irrespective of age, ability, ethnicity, nationality, religion, sex, sexual orientation, or any other personal characteristic. It forms the foundation of the game, prioritizing the love of football and the joy of participation over professional achievements. Beyond being a sport, grassroots football helps instill positive values, promotes healthier lifestyles, and unites communities (UEFA 2024). The informal and community-driven nature of grassroots football also fosters a relaxed environment where participants are encouraged to learn, grow, and build relationships through the shared experience of playing football. Another defining feature of grassroots football is its adaptability. Whether played in parks, schoolyards, or improvised fields, grassroots football does not require formal pitches or expensive equipment. This accessibility lowers barriers to entry, making it easier for people across different social and economic backgrounds to get involved. By focusing on inclusivity, enjoyment, and accessibility, grassroots football not only nurtures a love for the sport but also encourages regular physical activity and social interaction.

1.3. Briefly Introduce the Global Economic Context of Climate Change

Climate change has emerged as a key challenge for the global economy, with far-reaching implications for several industries that depend on the natural environment, particularly agriculture, tourism and sports. The financial stability of these industries is increasingly under pressure due to the frequency of extreme weather events and changing climate patterns. For example, Swiss Re warns that the global economy could lose up to 18% of its GDP by 2050 if global temperatures rise by 3.2°C, and in the worst-case scenario, this figure could be even higher. This worrying projection is based on the current trajectory of temperature rise and the failure to fulfil the Paris Agreement. Failure to address climate change could result in economic losses of $1.7 trillion per year by 2050. It also highlights that grassroots football clubs will be disproportionately affected by climate change due to resource and financial constraints, making the need to explore the economic impact of climate change on the sector increasingly important.

1.4. Briefly Introduce the Economic About Grassroots Football

Grassroots football plays a vital role in local communities, with grassroots football clubs not only providing a platform for physical activity for the residents of that community but also being a key driver in supporting small-scale local economies and creating jobs. According to UEFA research, grassroots football in Ireland contributes €1.8bn to the economy each year. Of this, €355 million is contributed directly through player spending, investment in facilities and volunteer work, with a further €1.14 billion saved in healthcare costs due to improved health and reduced chronic disease. Similarly, in England, grassroots football delivers over £10bn of benefits to society each year, largely in the form of public health contributions through the reduction of mental health problems. These findings highlight the importance of grassroots football in sustaining community wellbeing and reducing the healthcare burden. (UEFA, Irish FA, English FA)

Economically, grassroots football is a major driver of the local economy, particularly in more economically disadvantaged areas. These clubs are heavily reliant on community engagement and financial support from local resources such as match day revenue, sponsorship from small businesses and financial grants from local government. Although their operating funds are much smaller than those of professional clubs, their economic impact is still significant. Like professional football clubs, match days are one of the key sources of income for grassroots football clubs too, supporting local suppliers and event organizers through ticket sales, associated merchandise and food and drink sales.

In addition, grassroots football brings indirect benefits to the local economy through increased social cohesion, such as increased local business expenditure and community networks that attract further investment. However, it cannot be ignored that grassroots football still faces financial vulnerability, particularly in terms of maintaining basic facilities and operations, which emphasizes the need for continued community economic support.

While grassroots football encompasses the inclusive and accessible spirit of sport, grassroots football clubs bring this vision to life within communities. These clubs are more than just places for people to play; they are local institutions that foster connections, provide support, and serve as cornerstones of community life. In the next section, we will dive deeper into the vital role these clubs play within their communities.

1.5. Research Question and Objective

The question of this research is: **How does climate change economically impact grassroots football clubs?** Focusing on this question, this thesis aims to explore the immediate impacts of climate change on the economies of grassroots football clubs, including increases in operating costs, rising facility maintenance costs, and loss of match-day revenue due to extreme weather. In addition, the long-term economic risks of climate change on grassroots

football clubs will be assessed, particularly in areas where extreme weather is common, analyzing which clubs or areas are most vulnerable. Finally, the thesis will propose a series of strategies to enhance the economic resilience of grassroots football clubs in order to help clubs effectively mitigate economic pressures and achieve sustainable development in the face of climate change.

1.6. Literature Review

The impact of climate change and environmental disasters on grassroots football clubs and their communities in Europe is gradually increasing. A few papers have shown that extreme weather-induced increases in pitch maintenance costs, match cancellations, and reduced spectator attendance have put a strain on clubs' finances and on the communities that rely on grassroots football activities. These changes have also reduced community cohesion and lowered resident engagement. Some clubs and communities have taken adaptive measures such as infrastructure upgrades and diversifying revenue streams, but policy support remains inadequate in the resource-constrained field of grassroots football. The literature review lays the theoretical foundation in this thesis to help identify the impacts of climate change on grassroots football clubs and community economies and reveal research gaps. Through systematic analysis, the review presents the economic and social vulnerability of grassroots football in the context of climate change and summarizes the effectiveness of adaptation strategies to inform subsequent analysis and recommendations.

1.6.1. Impact of Climate Change and his Disasters on the Global Sports Industry

As the impacts of climate change rise, the global sports industry is taking a significant hit in terms of player health, event sustainability and adaptation measures. Research has shown that climate change and extreme weather poses a significant threat to the health of athletes and

spectators, with high temperatures exacerbating the risk of heat stroke, while air pollution and the risk of infections pose challenges to the health of players or fans.

Climate change also increases the cost of operating sporting events and venues. Extreme weather events may cause some damage to venues, which increases the need and cost for owners or governments to maintain their venues, and many sports organizations are forced to take measures to mitigate the impacts of climate change on their venues. However, the implementation of these measures is also limited by revenue requirements and commercial pressures.

Although there are international climate agreements such as the Paris Agreement that attempt to control greenhouse gas emissions, implementation remains difficult. Therefore, climate change is having a significant impact on the sports industry, but it is also furthering the implementation and development of sustainability goals across all sectors, but strategies need to be further strengthened to adapt to the changing climate.

1.6.2. Economic Impact of Climate Change on Communities

Infrastructure costs, increased fluctuations in industry revenues and increased vulnerability of small and medium-sized enterprises. Literature shows that disasters such as floods and heavy rains caused by extreme weather place an additional burden on the maintenance and repair of infrastructure such as roads and water supply systems in communities. The construction of drainage and flood protection systems to enhance the resilience of infrastructure in communities in the face of climate threats increases long-term financial expenditures. In addition, erratic weather brought about by climate change impacts on revenues in sectors that depend on natural conditions, such as agriculture and tourism. Study shows that small and medium-sized enterprises are not able to receive adequate financial assistance from local governments due to fluctuating revenues caused by climatic hazards, thus exacerbating the economic vulnerability of communities. The lack of policy support makes communities more

dependent on a single industry to effectively respond to the multiple economic challenges posed by climate. Overall, this literature reveals the multidimensional economic pressures that climate change brings to communities, highlights the importance of community adaptive capacity and policy support, and provides a theoretical basis for the in-depth analyses and recommendations of this study.

1.6.3. Economic Structure of Grassroots Football Club

The economic structure of grassroots football clubs relies heavily on membership fees, donations, and small sponsorships from local businesses. Unlike professional clubs that generate substantial revenues through media rights and merchandising, grassroots clubs face significant challenges in securing funding. Their fragile economic structure makes it difficult to sustain daily operations and meet developmental needs. Revenue streams are narrow and susceptible to economic fluctuations, and resource investments remain limited.

Community engagement is also a critical aspect of grassroots clubs. Many adopt a governance model that emphasizes democratic community participation and local identity. This approach not only fosters a sense of belonging within the community but also enhances operational stability by securing a portion of the club's financial income through member and fan loyalty. Clubs operating under this model demonstrate the prioritization of community welfare over profit-driven motives.

Additionally, financial regulations such as the Financial Fair Play rules, though designed for professional football leagues, indirectly impact grassroots clubs. These regulations exacerbate financial pressures by diverting limited resources towards essential expenses like player salaries and ground maintenance. Consequently, grassroots clubs often have less financial flexibility and face a substantial gap compared to professional clubs with diversified income sources.

1.7 Research Methodology

1.7.1. Research Design

This study used a qualitative research methodology combining a literature review with semi-structured interviews to explore the economic impact of climate change and environmental disasters on grassroots football clubs. The aim of this approach was to analyze the problem in depth from different perspectives, to compensate for the inadequacy of a single source of data and to provide wider support for the research through the integration of data from the literature that already exists, and the data currently stated by personnel in grassroots football clubs.

1.7.2. Data Collection

The data for the study comes from the following two main sources:

Literature Review

Purpose and Role: The purpose of the literature review is to establish a theoretical foundation for the thesis and identify research gaps related to the economic impacts of climate change on grassroots football. By analyzing existing research, this part of the thesis aims to understand the direct and indirect economic impacts of climate change on grassroots football and to highlight areas of under-researched research.

Literature Selection Criteria: Literature was selected based on relevance, currency and credibility of sources. Peer-reviewed journal articles, government publications and sports organization reports dealing with climate change, economic impacts or grassroots football were included. Preference was given to studies within the last five years to ensure that the most up-to-date insights on the economic impacts of grassroots football were obtained.

Analysis: Key themes such as funding, facility maintenance costs and operational challenges posed by climate change were categorized and then analyzed. Comparative analyses highlight differences between regions and provide insights into local economic impacts. In addition, the literature review identifies areas where grassroots football needs further economic support in addressing the challenges of climate change.

Semi-structured Interviews

Purpose and Methodology: The interviews complemented the literature review by providing in-depth qualitative insights into existing climate change-specific economic impacts on grassroots football clubs. Targeted interviews with club managers, finance officers and local sports officials provided insights into the economic strategies, sustainability efforts and external support received by grassroots football clubs in the face of climate change.

Interview Structure and Implementation: A semi-structured format for the interviews will be used, allowing flexibility to explore the unique experiences of each participant. Questions focused on topics such as club adaptation strategies, economic challenges for clubs in the face of climate change, and the challenges of maintaining economic stability in the face of climate stress. Interviews were conducted and audio-recorded online, transcribing the script to ensure accurate collection of detailed responses.

Qualitative Analysis: Responses were coded thematically, with a particular focus on recurring themes related to financial adaptation and resource allocation. By identifying common strategies and challenges, similar responses were collected to avoid multiple repetitions. The interview data collected provided contextual insights that complemented the quantitative findings and enhanced the overall depth of the study

1.7.3. Research Sample

Initially a questionnaire was distributed to over 100 grassroots football clubs in different regions of Portugal for this study but could not be taken up due to the lack of responses received. Subsequently focusing with interviews, with the introduction and network of the partner company Common Goal, the interviewees included staff from grassroots football clubs in Germany, experts and practitioners in fields related to grassroots football and climate change. They each provided insights into grassroots football's response to climate change and environmental disasters in different regions.

2. Analysis

2.1. Economic Impact of Climate Change on Grassroots Football

2.1.1. Definition of the Economic Impacts of Climate Change

The Economic Impacts of Climate Change

The definition of economic impacts of climate change refers to changes in financial status and economic activity because of changes in climate patterns. These impacts can be direct or indirect, affecting multiple areas, including sport and leisure activities. In the context of grassroots football clubs, the economic impacts of climate change can be demonstrated in the following ways:

Direct economic losses: This includes the direct financial burden on grassroots football clubs arising from climate change related factors. Examples include increased maintenance and repair costs for club facilities. When extreme weather events such as storms and flooding may damage grounds, facilities and equipment. Clubs may face costs to repair or replace damaged infrastructure.

Loss of Direct Revenue: Grassroots football clubs are often reliant on match day ticket sales, sponsorships and fundraising events to generate the revenue needed to sustain club operations.

Climate change could have a direct negative impact on these sources of income. For example, in extreme weather conditions, fans may be prevented from attending matches, or the number of fans attending matches may be drastically reduced, leading to a drop in income from ticket and snack, and alcohol sales; or matches and tournaments may be cancelled outright, directly impacting on the gate receipts on which clubs primarily rely.

Impacts on small-scale community economies: the economic impacts of climate change are not only in terms of direct costs and changes in revenue. Small scale community economies will also be affected, for example, fans usually have get-togethers before or after matches, often choosing restaurants in the community, but under the impacts of climate change, fans who are less likely to be out and about will similarly be less likely to eat out, and similarly, small bars and cafes etc. in the community will be similarly affected, with revenues on match-days being drastically reduced due to the climate change.

Community Economic Vulnerability

It is widely recognized in the research literature that the economic vulnerability of a community refers to the extent to which the economic dimension of the community is susceptible to damage in the face of external stresses such as natural disasters or economic shocks. This vulnerability is usually influenced by factors such as the monolithic nature of a community's economic structure, a high proportion of low-income households, and inadequate social support systems. Specifically, mono-industry dependence and higher unemployment rates make it difficult for communities to resume economic activity in times of crisis, leading to increased unemployment, reduced incomes and a heightened risk of disruption to basic services.

In the context of climate change, the economic vulnerability of grassroots football clubs becomes an important expression of community economic vulnerability. Through this lens,

community economic vulnerability is not limited to impacts on business and infrastructure but also encompasses far-reaching impacts on grassroots sport and its support for communities.

In the relationship between a community's economic vulnerability and resilience, economic vulnerability determines the extent to which a community is impacted by a shock, while economic resilience is a community's ability to recover from a shock. Economic vulnerability of communities can be effectively reduced and resilience to crises increased through increased industrial diversification, improved social welfare and enhanced infrastructure. This analysis can also help communities and policymakers focus on how to improve the economic resilience of the community by increasing the resilience of grassroots clubs.

2.1.2. Direct Economic Impact on Grassroots Football Clubs

The direct economic impacts of climate change on grassroots football clubs are mainly in the form of loss of infrastructure, reduced matchday revenues, and impacts on the small-scale economy. Extreme weather events can damage football grounds and increase maintenance costs, leading to higher operating costs for clubs. At the same time, climate uncertainty can lead to match cancellations or reduced crowds, directly impacting revenues from tickets, food and drink sales and local sponsorships. These economic pressures not only pose a threat to the financial stability of clubs but also add to the economic burden of the small communities that depend on them.

Facilities

Extreme weather, such as heavy rainfall, flooding and drought, poses a significant threat to the facilities and infrastructure of grassroots football. Heavy rainfall may lead to waterlogging of football pitches and damage to the turf, while drought may dry out and harden the ground, making it more difficult and costly to maintain pitches. Damage to football pitches is exacerbated when drainage systems are unable to respond effectively to heavy rainfall. Affected by these weather extremes, grassroots clubs often must invest more in their facilities

or even need to rebuild their infrastructure to ensure that their grounds are fit for purpose. In addition, the cost of equipment damage, pitch cleaning and maintenance rises dramatically, and these expenses are often beyond the normal budgets of grassroots clubs, so this can also lead to financial difficulties for them, as repairing the infrastructure requires significant investment.

In Germany, for example, flooding caused by climate change has already forced some grassroots clubs to increase their investment in facility maintenance. Climate change exacerbates the severity of these problems, especially among grassroots clubs that are financially weaker. These clubs often lack sufficient funds to cope with the repair costs associated with natural disasters, further exacerbating their financial pressures. According to Ilan Noy and Rio Yonson in Economic Vulnerability and Resilience to Natural Hazards, the impact of natural disasters is particularly pronounced on the infrastructure of economically vulnerable communities, which often lack the capacity to cope with the additional restoration costs.

Match-days Revenue

One of the economic impacts of climate change on grassroots football is the fluctuation of matchday revenues. Extreme weather events, such as heavy rainfall, drought and high temperatures, lead to match cancellations or reduced spectator attendance, which directly affects the revenues of grassroots football clubs. The main sources of income for grassroots clubs include ticket sales, on-site consumption (e.g. food and drink sales) and small-scale community sponsorships. However, due to the uncertainty of climatic conditions, particularly when matches are cancelled due to bad weather or spectator attendance drops, clubs' revenues are significantly reduced.

For example, in Germany, match interruptions due to heavy rainfall and extreme weather resulted in lost revenue from same-day ticket sales and in-venue food and beverage. This loss of revenue exacerbates financial pressures on clubs and affects their normal operations. Fuss et al. in Betting on Negative Emission Technologies note that the uncertainty associated with climate change could have far-reaching impacts on the local economy, particularly in communities that rely on matchday revenues. In addition, the instability of revenues due to climate change not only affects the short-term financial position of clubs but may also threaten their long-term sustainability. Grassroots football clubs face greater financial challenges and require more support and resources to sustain their operations when match scheduling is unstable due to climate change.

The Rapid Transition Alliance report further states that the average annual availability of grassroots football grounds in the UK has been reduced by between six weeks and two months as the frequency of flooding increases due to climate change. These changes not only threaten the financial position of clubs but also increase the challenges of maintaining and managing facilities, affecting match scheduling and community engagement.

In summary, climate change poses serious challenges to the revenue and operations of grassroots football clubs. Not only do clubs face high facility maintenance costs, but they also have to cope with the volatility of income from reduced match scheduling and spectator attendance. Therefore, to cope with the risks posed by climate change, grassroots football clubs need more investment, policy support and adaptation to ensure their long-term financial stability and sustainability.

Small Scale Economic

Climate change has a direct impact on the small-scale economy around grassroots football clubs, particularly in terms of local businesses such as restaurants, cafés and bars in the vicinity of clubs. As weather patterns become more extreme, clubs will cancel matches more

frequently, particularly due to cancellations caused by flooding or intense heatwaves, leading to a loss of income for these small-scale, self-employed businesses on match days. For example, heavy rain or poor weather conditions can disrupt normal footfall around clubs, leading to a decline in local trade that relies on an influx of fans before and after matches. Or the cancellation of a match resulting in no fans coming to spend money, etc. This economic loss can particularly hit local businesses in working class communities where small, family-run shops are more susceptible to changes in footfall and can easily see a significant reduction in their income once a match has been affected by the weather.

In some areas, it has been reported that amateur football matches are often postponed or cancelled due to extreme weather conditions, further eroding income-generating opportunities for local businesses. As climate change continues to affect the predictability of weather, this issue may exacerbate the economic difficulties of these small businesses.

2.1.3. Local Economics' Dependence on Grassroots Football Clubs

The reliance of grassroots football clubs on the local economy includes, in addition to direct and indirect economic benefits, the driving of revenue growth in local small businesses and service industries. Grassroots football matches usually attract spectators and fans to come to watch them, forming a certain consumer base and promoting the development of related industries such as catering, retail and accommodation in the neighborhood. According to a study conducted by the British Football Foundation, the spending effect brought about by such events can benefit small businesses in the vicinity of the clubs significantly on a yearly basis, including pubs, restaurants and sports shops, and so on, which usually see a significant increase in their turnover on match days.

In addition, academic research has pointed to the long-term impact of grassroots football clubs on the economic stability of communities. Twynam and Johnston (2004) in 'The impact of local football clubs on economic and social benefits in local communities' discuss that

grassroots football clubs help community residents to obtain more employment opportunities and sources of income by driving local economic activities, especially in some economically less developed areas where football tournament activities often become one of the economic drivers. The frequent organization of grass-roots football events can also generate sustained economic benefits, such as season ticket sales, sales of sportswear and related sports merchandise, and so on. The income generated from these events not only supports the day-to-day operations of the clubs but also contributes to the economic cycle of the community. However, the potential cancellation of matches and damage to venues due to extreme weather can reduce the consumer base of neighboring businesses and may pose a direct and indirect threat to these economic benefits. Businesses such as restaurants and bars are at risk of increased revenue volatility due to reduced spectators and lower spending because of climate instability. This not only affects small businesses in the vicinity of the clubs but also has a knock-on effect on the economy of the community, creating a sense of uncertainty and concern for businesses throughout the community.

These studies demonstrate the irreplaceable value of economic development, not only in driving consumption through grassroots football clubs' events, but also in playing an important social function in the community's small-scale economy. This economic dependency means that when climate change impacts on football venues and match days, the economy of the community around the club will be hit accordingly.

2.1.4 Case Study in Germany: Football club SG Ahrtal, Germany

Introduction: The economic impacts of climate change on grassroots football clubs in Germany are highlighted in the case of SG Ahrtal FC.2021 In July 2021, a major flood occurred in the Al Valley region of Germany, and this flood not only had a severe impact on many parts of Europe, The German Olympic Committee said more than €100m worth of damage was done to grassroots sports infrastructure in their country alone, but also caused

significant damage to the facilities and economic pressure on the SG Ahrtal grassroots football club in Germany. The flooding not only destroyed much of the infrastructure in the Al Valley, but also severely impacted the grounds, buildings and equipment of the SG Ahrtal club, making it difficult for the club to resume normal operations. Chelsea forward Kai Havertz told Sky Sports: "After the holidays, I went to Germany, and I drove through some of the streets. I saw everything was destroyed and the water was very high. A lot of people lost their homes, clothes, their pets and their memories." This case, which will be discussed shortly, demonstrates the devastating impact of climate change-induced weather extremes on the economy of grassroots football clubs.

Damage to Infrastructure and Facilities: The floods in the Al Valley directly destroyed SG Ahrtal's pitch and club facilities, causing massive damage. In the aftermath of the floods, the club had to invest significant resources and funds to clean up the damaged facilities and repair the damage. However, SG Ahrtal's rebuilding process came under very significant financial pressure as grassroots clubs often lack adequate funding. According to Earth Refuge, typically, grassroots clubs are financially weak and often struggle to afford the extra expenses associated with extreme weather. However, the SG Ahrtal club is now facing a very tough situation, as they need a lot of money to repair the damaged facilities, which means that the grassroots club will face a very challenging time in its operations.

To restore and maintain the infrastructure, the club has had to rely on community donations and volunteer help, but still faces a huge funding shortfall. According to a study by the Helmholtz Climate Initiative in Germany, grassroots clubs are becoming increasingly vulnerable to the impacts of climate change, particularly the added high cost of repairs due to damaged facilities, which often exceed club budgets.

Loss of tournament revenue: Extreme weather not only damages club facilities but also affects the regularity of tournaments.SG Ahrtal's tournament was forced to be cancelled due to flood

damage, leading to a direct reduction in gate receipts and other tournament-related revenue. Ticket sales and on-site spending are important sources of income for grassroots clubs, and the cancellation of matches significantly eroded the club's revenue base. Research has reported that extreme weather brought on by climate change has put many clubs in Germany and other European countries at risk of unstable matchday revenues. In addition, Sky Sports reports that the frequency of climate change puts community and grassroots clubs in an economically vulnerable position when faced with extreme weather.

Impacts on the small-scale economy of the community: not only did the SG Ahrtal club take a direct economic hit, the small-scale economy of its neighboring community was also significantly affected by the flooding. Local restaurants, cafes and bars, etc. are dependent on match day spectator traffic and these small businesses suffered a significant impact in terms of reduced revenue as matches were reduced or cancelled. Research by the Helmholtz Climate Initiative has shown that grassroots football clubs play an important role in the community's economy, and that when the club's activities are restricted, the neighboring businesses are also affected, resulting in reduced economic activity for the community.

According to the Rapid Transition Alliance in their report Playing against the clock, the increased frequency of match cancellations for grassroots football clubs under the impacts of climate change not only undermines the clubs' own economic viability, but also results in a non-negligible loss to the small economies that rely on the clubs' activities.

Long-term implications and recommendations for response: The case of SG Ahrtal demonstrates the short- and long-term threats that climate change poses to the economies of grassroots clubs. The damaging impacts of extreme weather on clubs' infrastructure and revenue streams could lead to a decline in the long-term viability of clubs. At the same time, the dependence of community economies on grassroots football clubs highlights the importance of socializing and economizing grassroots clubs. This suggests that grassroots

football in Germany needs more policy support and financial help to cope with possible future climate change challenges.

This case study of grassroots football clubs in Germany shows that the impact of climate change on the economy of grassroots football clubs has become a pressing issue. Strengthening the resilience of grassroots clubs, for example by increasing financial support and encouraging mutual aid in the community, would be an effective measure to address these challenges posed by climate change.

3. Conclusion and Recommendations

3.1. Summary of Financial Challenges

This sub-research theme summarizes the multiple financial challenges posed by climate change to grassroots football clubs, particularly the impacts of facility damage, fluctuating tournament revenues, and dependence on the economies of small-scale communities. As we can see in the case of grassroots football clubs in Germany, damage to facilities and the interruption or postponement of fixtures due to extreme weather events such as flooding, heat and drought not only directly increase the club's repair and maintenance costs, but also have a significant impact on matchday revenues. In the case of the SG Ahrtal club, the flooding in 2021 damaged the club's facilities, making them dependent on community support to maintain operations. In addition, the reduction in club activity resulted in a significant drop in customer traffic from small businesses in the neighborhood, which impacted the economy of the community. The direct and indirect economic losses from climate change have weakened the financial stability of grassroots clubs and increased their economic vulnerability.

3.2. Vulnerability of the Local Economy

Not only do grassroots football clubs face the challenges posed by climate change financially, but the local economies of the communities in which they are based also appear to be

extremely vulnerable. Small-scale economies that depend on football activities, particularly restaurants, cafes and bars, suffer from loss of income due to match cancellations or reduced attendance. In the case of some specific grassroots football clubs, climate change-induced disasters have caused a sharp drop in revenue for small and medium-sized businesses in the community, highlighting the high dependence of these businesses on match-day revenue. The economic vulnerability of such communities is exacerbated by climate change and is particularly pronounced in poorer or economically homogenous areas. This suggests that increasing the economic resilience of grassroots clubs and their communities is critical to coping with the economic impacts of climate change.

3.3. Adaptation Strategies

In response to the challenges of climate change, grassroots football clubs can increase resilience by adopting adaptive strategies. Firstly, clubs should invest in more climate-resilient infrastructure, such as improved drainage systems to cope with frequent precipitation and flooding. Clubs like some in the UK have reduced weather-induced match disruption by introducing climate-adapted turf and drainage technologies. Second, diversifying revenue sources is also an important measure to improve financial stability. Clubs can increase their revenue sources on non-match days by expanding community activities such as training programs or venue facilities for tournament rental. In addition, the government and relevant organizations should provide policy support and financial assistance to help grassroots clubs improve their resilience in the context of climate change.

While exploring the economic impact of grassroots football and its role in fostering local economies, this paper shifts focus to the social benefits of grassroots football, specifically examining its potential to reduce inequalities and promote social inclusion in communities through initiatives like Play for Change in Italy.

4. Research Limitation and Future Research

4.1 Research Limitation

During this study, I attempted to obtain relevant data by means of a questionnaire issued to over one hundred grassroots football clubs, but none of them received a response. For this reason, I eventually discussed and shifted our country of focus with partner companies and subsequently used the interview method and literature review to complete the study. However, there are still obvious limitations of this method:

Lack of a large amount of real data support: due to the inability to collect specific data of grassroots football clubs, especially financial related information, the study has many deficiencies in the representativeness and extensiveness of the data, especially when it is necessary to pay attention to the impact of climate change on the club's finances, I cannot make comparisons through the specific changes in the data, and can only prove that the financial aspects are really affected through the oral statements of the interviewees.

Difficulty of data statistics of grassroots clubs: most grassroots clubs are predominantly volunteer-based and lack systematic data management or statistical awareness, which makes it extremely difficult to obtain data. Especially when it comes to sensitive information such as finances and policies, grassroots club staff are generally unwilling or unable to provide relevant data. These limitations make the conclusions of this study more based on existing literature and interview results, and lack of specific quantitative analyses, thus affecting the depth and generalizability of the study to a certain extent. And I cannot gather specific suggestions for the grassroots football clubs based on the existing literature.

4.2 Future Research

Based on the existing limitations of this study, future research could be expanded in several ways to overcome the limitations of the current study and deepen the understanding of the impact of climate change on grassroots football clubs.

Future research should focus on collecting and analyzing quantitative data for long period, such as changes in the financial situation of clubs, the number of people involved in the operation and management of clubs and the frequency of match interruptions, the use of club facilities and whether they are suffering from climate change damages, which climate change damages the clubs suffer more from, and so on. This will help to more accurately assess the ongoing impacts of climate change and its trends, and longitudinal studies to look at the long-term impacts of climate change on grassroots football, particularly changes to the financial stability of clubs, and the long-term use and maintenance of facilities etc.

5. Acknowledgment

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7. Appendix

A1 First Interview

The Interviewer: **Jonas Rathe (JR).**

The Interviewee: **Frank Schmidt (FS).** Head of CSR at the Lower Saxony Football Association (NFV)

Topic: Adaptation Strategies and Climate Adaptation in Amateur Football

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1. Introduction and General Perception

JR: To what extent do you think amateur football clubs are affected by climate change?

FS: "Amateur football clubs are strongly impacted, especially by increasingly frequent extreme weather events like heavy rain, heatwaves, and drought. We see this not only as damaging sports facilities but also as an increased stress for our members. For example, summer heatwaves dry out grass fields, making it more difficult to hold regular training and raise watering and maintenance costs. Clubs in Lower Saxony, like TSV Havelse, have had to adapt their lawn care routines to protect the fields during hot summer months.

Climate change leads directly to increased costs for clubs, whether it’s from water expenses or repairs after storms. According to a 2022 study by the German Football Association (DFB), 72% of amateur clubs in Germany have recognized climate-related challenges (German Football Association, 2022). There’s definitely awareness, but the implementation of solutions requires both time and resources."

2. Adaptation Strategies and Technical Measures

JR: Have you already implemented any adaptation measures to address climate change? If so, which ones?

FS: "Yes, we've implemented several measures to better prepare amateur clubs for climate change. One example is installing drainage systems on sports fields to prevent flooding after heavy rainfall, allowing fields to be used more quickly afterward. A successful example is SC Borgfeld in Bremen, which improved the playability of its fields by 40% after installing a funded drainage system (DFB, Sustainability in Football, 2023).

Another solution that has proven effective for clubs, like FC Eintracht Norderstedt, is switching to artificial turf. While artificial turf has environmental drawbacks, such as microplastics, newer systems use recycled rubber granules, offering a viable compromise. For smaller clubs, these fields are a big help since they can be played on regardless of rain or drought."

JR: Which technical measures (e.g., artificial turf, drainage systems) do you consider most important for your clubs?

FS: "Drainage systems and sustainable field maintenance are priorities because of their long-term impact. Additionally, smart irrigation systems are becoming more essential for optimizing water management. The Berlin Football Association supports clubs by providing eco-friendly solutions tailored to the exact water needs of each field (Berlin Football Association, 2023). These systems use moisture sensors that activate irrigation only when needed, saving both water and costs. Such technology enables clubs to better handle heat and drought."

JR: What technical barriers or obstacles do you see to implementing these measures?

FS: "The biggest hurdle is funding. Technical adaptation measures are often costly, and amateur clubs usually have limited financial resources. Installing artificial turf or drainage systems can cost tens of thousands of euros. For instance, SV Wacker Osterwald relied on grants to install a drainage system. Additionally, knowledge is a challenge: many club

members are volunteers who don’t always have the technical know-how to maintain these systems. The DFB offers training and guidance, but it’s challenging for volunteers to fully acquire this expertise."

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3. Financial Feasibility

JR: Are there specific adaptation measures you would like to implement that are currently unfeasible due to costs?

FS: "Yes, definitely. Many clubs would like to install solar panels to save on energy costs and become more sustainable, but the initial investment is often too high. For example, FC Union Berlin’s youth academy has been powered by solar energy since 2021. For an average amateur club, however, these systems are financially out of reach even with subsidies. Many clubs could also benefit from eco-friendly turf, but these require significant upfront costs. Another project clubs are interested in is installing heat pumps for clubhouses, but again, the expenses pose a major obstacle."

JR: Does your association have access to funding or support for climate adaptation? If so, how helpful has this been?

FS: "There are several funding opportunities, especially at the federal level and through EU programs. The German government’s ‘Climate Adaptation in Sports’ funding guideline is a good support for climate adaptation projects. However, it often covers only 30–50% of the costs. An example is TV Friesen Telgte, which received funds from this program to improve its irrigation system. Clubs often still need to provide their own funds or find sponsors. The support is helpful but typically covers only a portion of the total cost, which remains a significant barrier for many clubs."

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4. Social Acceptance and Member Engagement

JR: How do club members (e.g., players, coaches, parents) feel about climate adaptation measures? Are there any forms of support or resistance?

FS: "Overall, members are very supportive, especially younger members and parents who are aware of the long-term effects of climate change. VfL Wolfsburg, which has made sustainability central to its infrastructure, is a good example of a club with high member buy-in. Many amateur clubs report similar experiences, with high enthusiasm for climate projects, whether it's work parties for field maintenance or fundraising events. However, some resistance does exist, especially among older members who may be more skeptical of changes or investments that could temporarily disrupt regular activities."

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5. Institutional Support and Partnerships

JR: Do you work with external partners (e.g., municipalities, sports federations) to implement climate adaptation measures?

FS: "Yes, partnerships with municipalities and sports federations are essential. An example is the 'Climate-Friendly Sports Field' project launched with the city of Hanover. Here, clubs collaborate with the city to create environmentally friendly fields and receive funding and technical support. We also work with the German Olympic Sports Confederation (DOSB) on training and consulting, allowing us to provide clubs with targeted information and expertise."

JR: Do you see opportunities to improve collaboration with external partners or other clubs?

FS: "Closer collaboration with local businesses would be beneficial, particularly for financing and sharing knowledge. The climate-friendly club network being piloted in the Baden-Württemberg regional association is a model we'd like to adopt. In this network, clubs share experiences and best practices, enhancing the effectiveness of adaptation measures."

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6. Long-Term Perspectives, Adaptation Goals, and Limitations

JR: What are your long-term adaptation goals for your clubs in response to climate change?

FS: "Our long-term goal is for all sports facilities within the NFV to be climate-friendly and resilient. This involves not only adapting the fields but also ensuring energy-efficient

clubhouses. FC St. Pauli's near-zero emissions stadium, which is partly energy self-sufficient, sets an example here. Such solutions are still challenging for amateur clubs, but we're working to provide the necessary resources and knowledge to move in this direction."

JR: What limitations or challenges do you see in implementing adaptation measures? Are there specific challenges that prevent your association from fully realizing these measures?

FS: "Primarily, it's financial resources. Even with funding programs, it's tough for many clubs to implement major measures like artificial turf or renewable energy installations, especially when municipalities are financially stretched. Bureaucracy can also delay implementation. For example, TV Jahn Delmenhorst faced a lengthy approval process for a new drainage system. These barriers make adaptation measures slower and more costly than initially planned."

A2 Second Interview

The Interviewer: **Jonas Rathe (JR).**

The Interviewee: Manfred Kohl **(MK).** President of TSV Bemerode, Hanover

Topic: Challenges in Climate Adaptation for Amateur Football Clubs

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1. Introduction and General Perception

JR: To what extent do you think TSV Bemerode is impacted by climate change?

MK: "To be honest, I don't feel that climate change has significantly impacted on our operations yet. Yes, there are more frequent heatwaves, some extreme rain, and maybe a few storms here and there, but in my view, these haven't disrupted our football activities to a degree that warrants major changes. We're a small club with limited resources, and climate adaptation just doesn't feel like a priority when the effects are not immediately visible or pressing. Most of our members are here to play football and enjoy the community. They haven't expressed any concerns about climate-related issues or shown a desire to address them, so it's difficult to justify prioritizing resources for this."

"We're aware of the broader discussions, of course, but our focus remains on the day-to-day running of the club. I think climate change feels more like a government or environmental

organization issue than something we need to address at the grassroots sports level, at least right now. Until we start seeing drastic changes, it’s hard to shift our priorities in this direction."

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2. Adaptation Strategies and Technical Measures

JR: Have you implemented any adaptation measures at the club to address climate changes? If not, what are the main barriers?

MK: "No, we haven’t implemented any specific climate adaptation measures at TSV Bemerode. Honestly, we’re already stretched thin trying to maintain basic operations, so climate measures just feel like an additional burden. It’s tough enough to keep our fields in decent condition, manage scheduling, and take care of general upkeep. Every new measure we’d consider would mean more work, more costs, and more time needed from our team, which we don’t have. There’s also a lack of awareness and understanding among our members about how these climate measures would actually benefit us directly, which makes it hard to get buy-in."

“The main barriers are time, money, and manpower. We’re largely run by volunteers, and while they’re dedicated, they already put in so many hours. To ask them to take on additional climate projects would mean stretching them even further, which isn’t realistic. Additionally, we’re not a wealthy club, and the costs of many of these measures are just not feasible for us. Most members don’t understand the long-term benefits enough to invest more time or resources, especially when their focus is on immediate, tangible club improvements rather than long-term environmental ones."

JR: Are there any technical adaptations, like artificial turf or drainage systems, that you would consider implementing if resources were available?

MK: "Well, if money weren’t an issue, sure, we might look into things like artificial turf, which would lower our maintenance needs and withstand different weather conditions. But realistically, that’s a pipe dream right now. Installing something like artificial turf can cost tens of thousands of euros, which is just beyond our means. We struggle to cover the costs for uniforms, equipment, and regular field maintenance—things that are essential for keeping the club functioning."

“We’ve looked at options for upgrading our facilities before, but when we factor in the costs, the limited grants available, and the lack of people to lead these projects, it becomes clear that these are not feasible for us right now. Our members want to see improvements in our basic infrastructure first, so there’s limited enthusiasm for climate-related projects that don’t seem like immediate needs."

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3. Financial Feasibility

JR: Is there any climate adaptation measures you’d like to implement that currently aren’t feasible due to financial limitations?

MK: "Absolutely. I think a lot of clubs like ours would love to improve field drainage, for example, or even investigate renewable energy options like solar panels to reduce our energy bills. But it’s the costs that are the biggest deterrent. Even with subsidies and grants, which sometimes cover a percentage, the remaining amount is usually more than we can afford. And we’d need to go through a long, complex process to secure those funds. For a club like ours, which runs on membership fees and modest sponsorships, every euro has to be carefully allocated."

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4. Social Acceptance and Member Engagement

JR: How do the club’s members feel about climate adaptation? Is there support or resistance?

MK: "Most of our members are indifferent, to be honest. They come here to play football and spend time with friends; they’re not overly concerned with climate adaptation. When we have meetings or discussions about club needs, no one brings up climate issues. They want to see improvements that directly enhance their playing experience, like better equipment, more comfortable facilities, and smoother field conditions. Climate adaptation feels like a secondary concern at best."

“I wouldn’t say there’s resistance, but there’s no strong interest. For many members, climate measures seem like something more suited to cities or governments. Our role, as they see it, is to provide a space for sports and the community, not necessarily to address environmental concerns. If we tried to push this agenda, I think it would be met with confusion or even frustration, as members might see it as diverting resources away from things they care about."

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5. Institutional Support and Partnerships

JR: Do you work with any external partners to help with adaptation measures, or would support from associations or local government be helpful?

MK: "We don’t have any formal partnerships specifically for climate adaptation, though we do work with the city on general maintenance. Even getting support for basic upkeep can be challenging enough, as we often must go through bureaucratic channels and paperwork to get funding approved. The city has helped with basic maintenance, but they have limited resources and many clubs to support, so it’s always a balancing act."

“I’d welcome more support if it was straightforward and didn’t require too much additional work on our part. But often, even when funding is available, the application and reporting processes are so complex that we just can’t keep up. For example, some of the state and federal grants have strict requirements and lengthy processes that would require more administrative manpower than we have. We simply don’t have the personnel to handle these additional responsibilities, so often we end up missing out on support that might help."

JR: Do you think cooperation with other clubs or local partners could help?

MK: "In theory, cooperation sounds good, but practically, I’m not sure how much it would help. All the other clubs I know are dealing with similar issues—tight budgets, limited personnel, and the pressure to prioritize immediate needs. We’re all in the same boat. If we had dedicated personnel to handle these kinds of partnerships and climate initiatives, it might be different. Right now, though, I think everyone is just trying to keep their heads above water with the basics."

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6. Long-Term Perspectives and Limitations of Adaptation

JR: Do you see any long-term climate adaptation goals for TSV Bemerode? Are there specific challenges that would prevent your club from pursuing these measures?

MK: "Right now, our main goal is simply to keep the club running, offer good experiences for our members, and make sure our facilities are safe and usable. Talking about long-term

climate adaptation goals feels unrealistic given our current resources. We're already stretched in every way—financially, in terms of time, and with the manpower we have. The idea of setting aside resources for long-term climate adaptation feels like a luxury we just can't afford."

"Our main limitations are pretty clear: a lack of time, a lack of money, and a lack of people to implement these changes. For us, taking on climate projects would mean taking away resources from our core mission of supporting our players and community. If, down the line, more substantial support becomes available, we might reconsider, but for now, our priority has to be on serving the immediate needs of our club and members. Climate adaptation, while important, just doesn't fit into our current reality."

A3 Third Interview

The Interviewer: **Jonas Rathe (JR).**

The Interviewee: **Christian Hein (CH).** Player at TSV Bemerode, Hanover

Topic: Frustration over the lack of climate adaptation measures and the club's handling of climatic challenges

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1. Introduction and Perception of Climate Change at the Club

JR: In your opinion, how much are amateur football clubs affected by the consequences of climate change? What climate-related challenges have you observed in your club over the past few years?

CH: "I think, like many other amateur clubs, TSV Bemerode is affected by climate change, but the problem is not really recognized. Over the last few years, we've been facing extreme weather conditions more often. The summers are getting hotter, the pitches dry out, or after heavy rainfall, they become mud pits. This affects both training and matches. Often, we can't train as planned or must postpone games because the pitches are unplayable. The weather extremes seem to be increasing, but the club doesn't take any real action to address it. Instead, we just keep pushing forward with no real plan for adapting."

JR: Do you personally feel that climate change is recognized as a problem in your club?

CH: “Unfortunately, no. I feel like the topic of climate change and the need for adaptation is totally ignored at the club. We talk about it a bit when we’re standing on the pitch during the summer heat and can barely see anything, but there’s no real action taken. It’s just brushed aside, as if nothing has happened.”

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2. Adaptation Strategies and Technical Measures

JR: Have you implemented any adaptation measures to respond to climatic changes? If so, what?

CH: *“*Unfortunately, no. There has never been any real discussion or planning on how we can adapt to climate change. Once, there was talk about laying down artificial turf or improving the drainage system, but nothing came of it. I feel like these things are only brought up when we are directly confronted with problems like flooded pitches, but no concrete steps are taken.”

JR: What technical measures do you think are most important for your club?

CH: “The biggest problem is the pitches. We should seriously consider switching to artificial turf or at least investing in better drainage systems. This would allow us to keep playing even in bad weather. Especially at our club, where rain often makes the pitches unplayable, such investments would be very useful. The pitch is the heart of the club, after all.”

JR: What technical hurdles or obstacles do you see in implementing such measures?

CH: “The biggest obstacle is the money. Artificial turf and drainage systems are expensive, and the club just doesn’t have the funds for that. But I also think it’s about a lack of initiative. No one is really pushing for it, even though we all know it’s necessary. It just keeps getting postponed, but the problems aren’t going to get any smaller.”

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3. Financial Feasibility

JR: Are there any adaptation measures you would like to implement but cannot be due to costs?

CH: “Definitely the artificial turf. If we had that, we could keep playing regardless of the weather, and the quality of the pitch would improve significantly. But like I said, the investment is just too high for our club. Even improving the drainage system would be helpful, but we simply lack the necessary funds.”

JR: Does your club have access to funding or support for climate change adaptation? If so, how helpful has it been?

CH: “As far as I know, there’s no concrete funding available to us. There may be some local or state funding opportunities, but we’ve never really worked on taking advantage of them. There’s just no initiative to investigate it. It would be helpful if we got more external support.”

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4. Social Acceptance and Member Engagement

JR: How do club members (e.g., players, coaches, parents) feel about climate-related adaptation measures? Is there support or resistance?

CH: “I would say that most of the members don’t even think about it. There are some players who do care, but the majority are more focused on sport and less on climate change. The coaching staff feels the same way—they’re more concerned with organizing the games and keeping training going. Parents and members usually support us, but not actively when it comes to long-term issues like this. There’s no real push or awareness that we need to act now.”

JR: How strong is engagement within the club for sustainable adaptations to climate change?

CH: “Unfortunately, the engagement is very low. As I said, the topic comes up every now and then, but it’s never followed through. We talk about how we could improve things, but without concrete actions and leadership from the club’s management, the engagement never really takes shape.”

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5. Institutional Support and Cooperation

JR: Do you collaborate with external partners (e.g., municipalities, sports federations) to implement climate adaptation measures?

CH: “Unfortunately, no. We don’t have any partnerships with external organizations that could help us implement adaptation measures. We’ve never really thought about how to get support from sports federations or the city. There’s just no initiative in that direction.”

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6. Long-Term Perspectives and Adaptation Goals

JR: What long-term adaptation goals do you have for your club in relation to climate change?

CH: “Long-term, I hope the club will finally start taking this issue seriously. The goal should be to improve the infrastructure so that we can keep playing no matter what the weather and at the same time enable more sustainable use of our resources. This includes artificial turf, but also better pitch maintenance and a more sustainable energy supply.”

JR: Are there any ideas or projects you would like to pursue if resources and support were available?

CH: “If we had the resources, I would love to see us switch to artificial turf and redesign the entire facility to be better suited to the climatic conditions. A partnership with the city or sports federations could help us with that. But it all depends on whether the club has the will to take these issues seriously and take action.”

A4 Fourth Interview

The Interviewer: **Jonas Rathe (JR).**

The Interviewee: **Matthias Lambrecht (ML).** Sustainability Manager at TSV Havelse

Topic: Successful implementation of a sustainability strategy, with financial limitations

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1. Introduction and General Perception of Climate Change Impacts

JR: How much do you think amateur football clubs are affected by the consequences of climate change? What climate-related challenges have you observed in your club in recent years?

ML: "Amateur football clubs, especially those like ours, are increasingly affected by the consequences of climate change. We notice the extreme weather conditions more and more. The hotter summers with increased drought risks and sudden heavy rainfall are common challenges we face. Our grass pitch suffers in heavy rain due to poor drainage, and on hot summer days, we struggle to maintain the quality of our fields. These challenges are becoming more problematic unless we take action."

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2. Adaptation Strategies and Technical Measures

JR: Have you already implemented adaptation measures to respond to climate change? If so, which ones?

ML: "Yes, we've already taken some measures. A few years ago, we decided to focus on making our infrastructure more environmentally friendly. One of the most important decisions was to modernize the drainage system of our pitch to improve water runoff during heavy rains. This alone cost around 80,000 euros. We also installed an artificial turf pitch, which has helped us maintain the field even during hot summer months. This installation cost about 1.000.000 euros. However, the biggest challenge has been the financing of these projects."

JR: Which technical measures do you consider most important for your club?

ML: "The key technical measures for us are improving pitch infrastructure and installing energy-efficient systems. The artificial turf and the new drainage system have been crucial steps. Other measures we want to implement include a rainwater harvesting system to irrigate the pitch and the installation of solar panels on our buildings to reduce our energy consumption. Expanding the solar system would cost us about 150,000 euros, and the rainwater system is estimated at 50,000 euros."

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3. Financial Feasibility

JR: Are there any adaptation measures that you would like to implement but cannot be due to cost constraints?

ML: "Yes, there are many ideas we would love to implement, but they are just financially unfeasible. For example, we want to expand our solar panel system or install green roofs on our buildings to improve energy efficiency. These projects are very costly – just expanding the solar system would cost at least 200,000 euros. Without strong financial support, we wouldn't be able to complete these projects. We are fortunate to have large sponsors who support us, but that's not the norm for all amateur clubs."

JR: Does your club have access to funding or support for climate adaptation? If so, how helpful have these been?

ML: "Yes, we have received some funding and support. Our main sponsors not only provide financial resources but also help raise awareness about the importance of sustainability. For example, we received a 50,000 euro grant through the "Climate-Friendly Sports Operations" program from the German Football League (DFL) for the installation of the artificial turf. This funding was crucial for us to carry out the project. In addition, we received a subsidy of 250,000 euros from the City of Hannover for the new pitch."

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4. Social Acceptance and Member Engagement

JR: How do the club members (players, coaches, parents) feel about climate-related adaptation measures? Is there support or resistance?

ML: "Generally, the reactions are positive. Especially younger players are very aware of the importance of sustainability and support such measures. Coaches and parents also understand the need for change. However, for larger investments like solar panels or the use of sustainable materials in new buildings, there have been some concerns, mainly due to the high costs involved in these measures."

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5. Institutional Support and Partnerships

JR: Do you work with external partners (e.g., municipalities, sports associations) to implement climate adaptation measures?

ML: "Yes, we collaborate with various external partners. For example, we worked with the City of Hannover to implement our rainwater system. We've also exchanged ideas with the Lower Saxony Football Association on various sustainable projects and have benefited from their expertise. However, I believe the collaboration could be stronger to make the implementation of sustainable projects easier for all clubs."

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6. Long-term Perspectives and Adaptation Goals

JR: What long-term adaptation goals do you have for your club regarding climate change?

ML: "In the long term, we aim to become a model club for sustainability in amateur football. We want to continuously reduce our environmental impact and increase the resilience of our infrastructure to climate challenges. A future goal would be to cover all our energy needs with renewable energy, use our resources more efficiently, and reduce our carbon emissions. Of course, this is only possible with solid financial backing, which is why we are focusing on expanding our network of sponsors and supporters."

Question: Are there any ideas or projects that you would like to pursue if resources and support were available?

ML: "Yes, we have several ideas. One of them is to expand our solar energy systems to reduce our long-term energy costs. We also aim to set up an educational program for the local community to promote sustainability in sports. If we had more financial resources and support, we could implement these projects much faster."

A5 Fifth Interview

The Interviewer: **Jonas Rathe (JR).**

The Interviewee: **Anthony Bright (AB).** Young Player at TSV Havelse

Topic: Climate Adaptation Measures in Football – Focus on Financial Issues and Volunteering

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1. Introduction and General Perception of Climate Change Impacts

JR: How much do you think amateur football clubs are affected by the consequences of climate change? What climate-related challenges have you observed in your club over the past years?

AB: "The impacts of climate change are definitely noticeable, even though our club has already taken some steps. Especially the weather extremes we've seen over the past few years—hot summers and heavy rain—make it harder to keep the pitches in good condition. Here at TSV Havelse, we already have artificial turf, which has really helped us avoid cancellations due to the weather. Without the artificial turf, we'd have had more match cancellations due to heavy rain or heat. But even with the artificial turf, climate change is still an issue, especially when it comes to other infrastructure needs."

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2. Adaptation Strategies and Technical Measures

JR: Have you already implemented any adaptation measures to respond to climate change? If yes, what were they?

AB: "Yes, we've installed artificial turf, which has been really helpful in avoiding weather-related cancellations. The artificial turf ensures that we can play in almost any weather, which is crucial for keeping the match schedule intact. We've also improved the drainage system on the artificial turf fields to prevent flooding during heavy rain. This has stabilized the playing surface and ensures consistent conditions."

JR: What technical measures do you think are most important for your club?

AB: "The artificial turf was definitely one of the most important measures to keep the games going despite extreme weather conditions. Additional measures like improving irrigation and drainage systems would be useful to ensure the artificial turf remains in good shape over time. There's also consideration for upgrading the lighting so that training sessions can be held at more flexible times, especially as we experience longer and darker winter evenings."

JR: What technical challenges or obstacles do you see in implementing these measures?

AB: "The biggest hurdle is still financing. Even though the artificial turf has helped a lot, there are other infrastructural needs that are costly. Additional floodlights or even better irrigation systems are expensive, and without external financial support, we can hardly afford these projects. The club cannot bear these costs on its own, and that's a real issue, especially when we know how necessary these investments are."

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3. Financial Feasibility

JR: Are there any adaptation measures you would like to implement but cannot be due to costs?

AB: "Yes, we'd love to do more in terms of sustainability and climate adaptation, but the costs are a barrier. Projects like expanding the artificial turf or installing solar panels on the club buildings would be great steps forward, but they are just too expensive. We managed to install the artificial turf thanks to strong sponsors, but without more external financial help, we can hardly take on such projects."

JR: Does your club have access to funding or support for climate change adaptation? If so, how helpful has this been?

AB: "The club has received some grants for the artificial turf in the past, which has been great. But beyond that, there's very little support, especially when it comes to larger projects. We've also received funding for improving the drainage, but overall, the financial resources are limited. There's definitely potential for more support if more public funding or grants for sustainable climate adaptation measures were available."

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4. Social Acceptance and Member Engagement

JR: How do the club members (players, coaches, parents) feel about climate-related adaptation measures? Is there support or resistance?

AB: "Most members are supportive of the adaptation measures, especially since we installed the artificial turf. The players appreciate being able to play in any weather. Some of the older members and parents are a bit concerned about the high costs of such projects, as they

question whether these investments are worth it in the long run. But overall, I think everyone understands that we have to respond to climate change, and as a club, we need to adapt."

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5. Institutional Support and Partnerships

Question: Do you work with external partners (e.g., municipalities, sports associations) to implement climate adaptation measures?

AB: "Yes, we worked with the city of Hanover to fund the artificial turf. That collaboration worked really well. However, there aren't enough such partnerships to implement all the necessary adaptation measures. More support from municipalities or sports associations would be extremely helpful, especially to better distribute the financial burden."

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6. Long-Term Perspectives and Adaptation Goals

JR: What long-term adaptation goals do you have for your club regarding climate change?

AB: "In the long run, we want to make the entire club more climate friendly. The artificial turf was an important first step, but we also want to optimize energy use, such as installing solar panels and using rainwater more effectively. It's important for us not only to focus on the playing surface but to make the entire club's infrastructure more sustainable."

A6 Sixth Interview

The Interviewer: **Jonas Rathe (JR).**

The Interviewee: **Simone Henning (SH).** Assistant at the Lower Saxony Sports Committee, Ministry of the Interior

Topic: Successful implementation of a sustainability strategy, with financial limitations

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1. Introduction and General Perception

JR: In your opinion, how are amateur football clubs affected by the impacts of climate change? What climate-related challenges have you observed in recent years?

SH: "The effects of climate change on amateur football clubs in Lower Saxony are quite tangible. Over recent years, we've seen an increase in heatwaves, heavy rainfall events, and longer dry spells, which place significant strain on pitches and club infrastructure. Many clubs are dealing with deteriorating field conditions and a rise in match cancellations. These changes are pushing clubs to seek long-term solutions for adaptation."

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2. Adaptation Strategies and Technical Measures

JR: What adaptation measures have you implemented at the state level for the sports sector? Which technical measures do you consider particularly important?

SH: "Artificial turf fields play a central role in adaptation strategies since they manage extreme weather better than natural grass pitches. Drainage systems are also crucial for preventing flooding. Through the program ‘Niedersachsen dreht auf’ (Lower Saxony Ramps Up), the state funds some measures, though resources are limited. Infrastructure investments are substantial, and clubs often need additional funding. Recent grants have been allocated to field renovations and energy-efficient lighting projects to reduce energy consumption."

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3. Financial Feasibility

JR: Are there specific adaptation measures you'd like to implement but find infeasible due to costs? What funding programs exist in Lower Saxony, and how helpful are they?

SH: "Certain adaptation measures are indeed challenging due to high costs. The Ministry of the Interior and Sports in Lower Saxony has introduced various funding programs, such as the Sportstättenförderprogramm Niedersachsen (Sports Facilities Funding Program), supporting measures like field and facility construction or renovation with a focus on climate adaptation. However, financing these initiatives remains challenging, as the state can only support a limited number of projects. Programs like the Gemeinschaftsaufgabe ‘Verbesserung der regionalen Wirtschaftsstruktur’ (Joint Task for Improving Regional Economic Structure, or GRW) offer funding in structurally weak regions, but they often require co-financing from municipalities."

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4. Institutional Support and Cooperation

JR: How does Germany’s federal system impact the funding of climate adaptation measures? How can federal and state governments work together?

SH: "In Germany, sports club funding is organized federally, meaning both the federal and state governments are responsible for certain subsidies. Limited state funds mean Lower Saxony relies on federal funds for larger, costlier projects. However, federal funds often come with specific requirements and bureaucratic hurdles, which are challenging for smaller clubs. The federal program Climate Resilience in Sports aims to support clubs in adapting to climate change, but many clubs struggle to meet their requirements. Closer coordination between federal and state levels would help allocate funds more efficiently."

Source: *Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety, "Sports Facilities Funding and Climate Resilience in Sports," 2023.*

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5. Long-Term Perspectives and Adaptation Goals

JR: What are Lower Saxony’s long-term goals regarding climate adaptation measures in sports? Are there plans for additional funding programs?

SH: "Lower Saxony's long-term goal is to provide amateur sports clubs with resilient and sustainable infrastructure. This includes promoting artificial turf, drainage systems, and energy-efficient lighting. The state plans to expand existing funding programs, though the realization of these plans heavily depends on available resources. We are also working to place greater emphasis on ecological sustainability in these programs, such as using recycled materials in sports field construction."

Source: *Lower Saxony Ministry of the Interior and Sports, "Sustainability Strategy Lower Saxony 2022."*