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Green Goals or Red Flags: A Case Study on the Economic Sustainability of the World's Greenest Football Club Using the Revised Altman Z-Score

Kadir ÇALIŞKAN [1*]

ABSTRACT

Purpose: Forest Green Rovers FC is considered to be the world's first vegan football club and is cited by FIFA as the world's most sustainable football club. These features highlight the club's unique place in social and environmental equity, but they also raise questions about its financial risk profile. This study aims to assess the economic sustainability and bankruptcy risk of Forest Green Rovers FC, which competes in the English National League.

Method: This study employs the revised Altman Z-score model as an early-warning tool to assess the financial sustainability and bankruptcy risk of Forest Green Rovers FC. The analysis is based on the most recent five fiscal years of longitudinal financial statements.

Results: Analysis of the results indicates significant financial deterioration from 2022 onwards, as reflected in worsening financial ratios, shrinking liquidity and profitability, negative equity, and growing operating losses. Despite strong environmental and corporate social sustainability practices, the club exhibits a persistently high-distress Z-score pattern, indicating sustained vulnerability to bankruptcy risk in the long term.

Conclusion: The findings demonstrate the need for a holistic sustainability and multidimensional value-creation approach in modern sports management, with financial risk management explicitly integrated with environmental and social objectives. The case also illustrates how cost-intensive green initiatives, when financed through concentrated ownership and fragile cash flows, can generate a "risk of green ambition" that threatens long-term financial sustainability. This study is the first research that examines the financial sustainability of Forest Green Rovers FC using the revised Altman Z-score model.

Keywords: Financial Risk Management, Bankruptcy Risk, Eco-Friendly Club, Environmental Responsibility, Economic Sustainability

ÖZET

Yeşil Hedefler mi, Kırmızı Bayraklar mı? Dünyanın En Çevreci Futbol Kulübünün Revize Edilmiş Altman Z-Skoru Yoluyla Ekonomik Sürdürülebilirliğine İlişkin Bir Vaka Çalışması

Amaç: Forest Green Rovers FC, dünyanın ilk vegan futbol kulübü olarak kabul edilmekte ve FIFA tarafından dünyanın en sürdürülebilir futbol kulübü olarak gösterilmektedir. Bu özellikler, kulübün sosyal ve çevresel eşitlik alanındaki özgün konumunu vurgulamakla birlikte finansal risk profiline ilişkin soruları da gündeme getirmektedir. Bu çalışma, İngiltere Ulusal Liginde mücadele eden Forest Green Rovers FC'nin finansal sürdürülebilirliğini ve iflas riskini değerlendirmek amacıyla gerçekleştirilmiştir.

Yöntem: Çalışmada kulübün finansal analizinin gerçekleştirilmesi amacıyla revize edilmiş Altman Z-skor modeli kullanılmıştır. Analiz, son beş mali yıla ait finansal tablolara dayanmaktadır.

Bulgular: Analiz sonuçları, kulübün mali yapısında 2022'den itibaren belirgin finansal bozulmayı göstermekte; bu durum kötüleşen finansal oranlar, azalan likidite ve kârlılık, negatif öz sermaye ve artan faaliyet zararlarıyla kendini göstermektedir. Güçlü çevresel ve kurumsal sosyal sürdürülebilirlik uygulamalarına rağmen, kulüp sürekli yüksek finansal kriz düzeyini yansıtan bir Z-skor eğilimi sergilemekte ve bu da uzun vadede iflas riskine karşı kalıcı kırılganlık işaret etmektedir.

Sonuç: Elde edilen bulgulardan yola çıkarak, modern spor yönetiminde finansal risk yönetiminin çevresel ve sosyal hedeflerle birlikte açıkça bütünleştirildiği bütüncül bir sürdürülebilirlik ve çok boyutlu değer yaratımı yaklaşımının gerekliliği ortaya konulmaktadır. Çalışma ayrıca yoğunlaşmış mülkiyet yapısı ve kırılgan nakit akışlarıyla finanse edilen yüksek maliyetli çevreci girişimlerin uzun vadeli finansal istikrarı tehdit eden bir "yeşil hırs riski" oluşturabileceğini öne sürmektedir. Bu çalışma, FIFA tarafından dünyanın en çevreci futbol kulübü olarak değerlendirilen Forest Green Rovers FC'nin finansal sürdürülebilirliğini revize edilmiş Altman Z-skor modeli aracılığıyla inceleyen ilk araştırmadır.

Anahtar Kelimeler: Finansal Risk Yönetimi, İflas Riski, Çevre Dostu Kulüp, Çevresel Sorumluluk, Ekonomik Sürdürülebilirlik

[1] Bitlis Eren University, Sport Sciences Faculty, Bitlis, Türkiye. ORCID NO: 0000-0001-7794-5991, kcaliskan@beu.edu.tr

[*] Yozgat Bozok University, Faculty of Sports Sciences, Yozgat, Türkiye. (Visiting Researcher)

INTRODUCTION

Sustainability has become a critical necessity in the global sports industry, particularly from a risk management perspective where environmental, social, and financial risks intersect (Samuel et al., 2025; Beki et al., 2024). Sports infrastructure and organisations now serve as key players in sustainable development, facing multifaceted risks across environmental impact, social responsibility, and economic factors. (Glibo & Koenigstorfer, 2023; Lucas et al., 2017). Especially large-scale venues/events significantly impact the environment, society, and economy through energy use, water consumption, raw material use, transportation, and waste discharge throughout their life cycle (Wicker & Thormann, 2024; Pourpakdelfekr & Oboudi, 2022; Warren, 2020; Kellison, 2015).

The domestication of Sustainable Development Goals (SDGs) as normative regulative instruments in political and business spheres has elevated financial sustainability and environmental compliance above traditional sporting success, introducing compliance and reputational risks (Biermann et al., 2022). The financial sustainability and environmental obligations of clubs are becoming more important than traditional sporting success (Barajas & Rodriguez, 2014). Unlike early 'green' initiatives focused on energy, water, and waste reduction (reduce, reuse, recycle), the agenda now demands integrated risk-aware approaches. For example, FIFA launched an environmental transformation with its ‘Green Goal’ campaign in 2006 (FIFA, 2011). Subsequently, the Financial Fair Play system implemented by UEFA has focused on financial transparency, the balance between income and expenditure, and clubs' ability to maintain their assets in the long term (UEFA, n.d.). Consequently, international football governance integrates environmental consciousness with responsible financial risk management. This evolution underscores that sports management must pursue reductions in ecological impact alongside economic resilience to avert compounded risks (Plumley et al., 2021; Grant, 2014; Pfahl, 2013). It demonstrates the necessity of integrating environmental and economic objectives in contemporary sports governance (Zbiljic & Siljak, 2024; Mallen & Chard, 2012).

Moreover, some authors point out that statistical and analytical tools in sports not only quantify but also shape sustainability and management practices (Yarrow & Kranke, 2016). This performative role aligns with environmental, social and financial sustainability in sports organisations. However, the literature reveals a gap in integrating financial sustainability with social and ecological missions within football clubs. Also, the unique financial structure of

sports organisations (unpredictable revenues, intangible assets, close community relations, etc.) frequently complicates the application of conventional economic models.

Numerous studies on Forest Green Rovers' environmental and social sustainability neglect quantitative analysis of its financial health and insolvency risk using the Altman Z-score. This study is the first to examine Forest Green Rovers FC, recognised by FIFA as the world's greenest football club, through the revised Altman Z-score, a robust predictive tool in sports economics. Conducting a longitudinal analysis of the club's financial statements over the past five years reveals the interplay between environmental consciousness and financial viability. Ultimately, the findings underscore multidimensional value creation for sustainable sports management and bridge gaps by integrating financial risk management with environmental and social objectives, offering insights for resilient club governance.

Theoretical Framework

The Greenest and the First Vegan Football Club: Forest Green Rovers FC

The sustainability vision of the Forest Green Rovers football club has set a precedent ***in*** the football industry (Budd, 2018). Voted "the world's greenest football club" by FIFA in 2017 (FIFA, 2022), the club represents an extraordinary case in environmental sustainability and management. Forest Green Rovers pioneered numerous initiatives and became the first football club to receive EMAS (Eco-Management and Audit Scheme) registration, requiring adherence to sustainable objectives and minimum standards across energy, water, waste, and carbon management through continuous improvement. In 2018, the United Nations recognised the club as the world's first carbon-neutral football club (Gashi, 2024; Papp-Vary & Farkas, 2022) and its chairman, Dale Vince, as a UN Climate Ambassador (UNFCCC, n.d.). Also in 2017, FGR officially became a vegan football club with the Vegan Trademark certification from The Vegan Society (The Vegan Society, 2017). Sustainability and social good remain central to Forest Green Rovers' business model, enhancing its brand value and overall social impact (Pape et al., 2023). The position serves as a middle ground between football operations and fans' expectations regarding social responsibility (Delia et al., 2024; Bodet & Seguin, 2021). This unique achievement reinforces the club's identity, brand value, and public awareness (Hacker, 2025a; Pietrzyk, 2021), promoting a sustainability ethos at grassroots levels through its fanbase and local roots while focusing on key stakeholders.

Recent research demonstrates that Forest Green Rovers not only exemplifies environmental sustainability but also embodies a radical eco-feminist and eco-centric management model that disrupts binary thought and integrates ethical, social, and

environmental considerations into its organisational structure (Samuel & McGouran, 2024; Samuel et al., 2022). This narrative shows how effective business generates not only financial results but multiple values (economic, social and environmental) through football as a strategic platform where sustainable growth and ethical values converge (Parry & Sarpong, 2025; Zbiljic & Siljak, 2024) This holistic approach positions the club as a model for environmental responsibility and social inclusivity, fostering deeper community engagement and brand loyalty. Football at Forest Green Rovers is more than athletic competition; it focuses on sustainable growth and ethical values (Papp-Vary & Farkas, 2022), attracting significant research attention (Pape et al., 2023; Delia et al., 2024; Pietrzyk, 2021; Samuel & McGouran, 2022; Bouvet, 2025; Samuel et al., 2018).

While environmental efforts form a key narrative, economic sustainability, particularly associated with bankruptcy risks, is equally critical. In this respect, the use of financial stability measures and bankruptcy prediction models is essential for analysing the economic fundamentals of clubs. In particular, the Altman Z-score model is one of the best-known methods in both academic and practice research (Anjum, 2012). Thus, examining FGR from an economic sustainability perspective can help fill the existing gap, enabling a more holistic evaluation of the club as a model of environmental and social sustainability.

Financial Risk Analysis in the Football Industry and the Altman Z-score Model

Financial statement analysis is a risk analysis based on the balance sheet and profit and loss account of an enterprise or organisation, which guides strategic decision-making (Tian & He, 2016; Robinson et al., 2015; Ball & Brown, 2013; Brealey et al., 2011). Some longitudinal assessments consider financial analysis over three and/or five consecutive years (Mercer & Harms, 2021). The assessments are generally made across three main areas: liquidity structure, solvency, and operational profitability (Hussein et al., 2023; Hammarström & Malmqvist, 2019; Akenga, 2017). The Altman Z-score model remains one of the classic approaches for assessing firm value (Anjum, 2012; Svabova et al., 2020). Originally developed by Altman (1968), it was later expanded into the Zeta model and modified as the 'Altman Z-score Modified Model' (Altman, 1984), and a recent variant is the 'Revised Four Model' (Altman, 1993). However, the revenue patterns, asset structures, and financial processes of sports organisations differ significantly from those of manufacturing firms (Fan et al., 2023). In particular, football clubs have been under strong pressure since the early 2000s to ensure financial sustainability with an increased risk of bankruptcy in Europe (Lago et al., 2006), and these issues remained even with an increase in football industry revenues

(Mirkovic et al., 2025; Georgievski et al., 2024; Alaminos & Fernandez, 2019). These unique characteristics, such as intangible fixed assets (player rights, brand value, fan base, etc.) and seasonal fluctuations in revenue, limit the applicability of standard financial models (Rompotis, 2024; Arnau Navarro, 2022). Consequently, the assessment of the financial structure of football clubs is critical for their sustainability over time and for predicting potential financial threats (Plumley et al., 2021). Therefore, the Altman Z-score, serves as an "early warning" tool, is also applicable to sports clubs (Philippou & Maguire, 2022).

Empirical Evidence and Model Validation

The predictive power and usefulness of the Altman Z-score model for detecting firms at risk of bankruptcy have been confirmed by several empirical studies (Svabova et al., 2020; Altman, 2013; Alkhatib & Bzour, 2011). Its generalisability across industries and countries supports its use for football clubs. Mondal et al. (2025) applied the Z-score to Japanese professional football clubs, revealing widespread financial distress, particularly among top-tier clubs. They highlighted how "promotion gambling" (excessive spending for sporting success) undermines long-term financial sustainability by prioritising short-term achievements. Mirkovic et al. (2025) analysed 88 clubs from the top divisions of England, Spain, Germany, and Italy (2017-2022), uncovering pervasive financial troubles across European football. Carin (2019) assessed the bankruptcy probability of French professional clubs, confirming the Z-score's strong predictive power alongside other financial ratios. Plumley et al. (2021) demonstrated financial risk across all sizes of English football clubs, validating the Altman Z-score as an effective predictor.

Apart from these papers, numerous studies have examined financial ratios and bankruptcy prediction to evaluate the financial condition of football clubs across different leagues and countries. For example, studies on top-division clubs in Europe, such as England (Plumley et al., 2021; Ika et al., 2021), Spain (Somoza Lopez, 2024), Germany (Zülch et al., 2023), France (Carin, 2019), Türkiye (Avşar & Kurtipek, 2024; Tutar & Medetoğlu, 2022) and the Netherlands (Gerritsen, 2015), have extensively employed this methodology in order to analyse financial viability and bankruptcy risk. Similar approaches have also been applied in Poland (Perechuda, 2020), Sweden (Ahmed & Karlsson, 2023), Denmark (Storm & Thomsen, 2016), Greece (Rompotis, 2024), and Japan (Mondal et al., 2025). Overall, these studies conclude that the modified Altman Z-score model is an effective indicator for predicting the risk of financial failure among football clubs and for analysing their financial position. Other methods, such as the COPRAS and S-Score methodologies, have also been

implemented in financial analysis (Evans, 2024; Yıldız & Bucak, 2017; Zoccali, 2011; Barajas & Rodriguez, 2010), yet the Altman Z-score remains the most widely used due to its simplicity and discriminant power. The consistent finding across all these studies is that the Z-score model provides a robust tool for objectively assessing the financial health of football clubs from a risk assessment perspective (Genovard et al., 2025). Despite growing revenues across European and other leagues, financial fragility persists due to overspending for sporting success, compromising economic sustainability. External shocks, such as the pandemic, further exacerbate these long-standing risks. Consequently, early-warning detection of financial distress is critical (Svabova et al., 2020), necessitating proactive management and timely interventions to prevent insolvency.

To conclude, although the sport-specific structures and industry characteristics may limit the model's precision, it remains a valuable tool for comparative financial risk assessment (Anjum, 2012). Building on this literature, this study aims to address the following research question:

RSQ1. *What is the level of bankruptcy risk and financial fragility for Forest Green Rovers FC, as measured by the revised Altman Z-score model in the context of financial sustainability?*

RSQ2. *What risk mitigation strategies or strategic insights does this case study offer for integrating sustainability initiatives with financial risk management in football clubs?*

This study contributes to the literature by analysing Forest Green Rovers FC, a club renowned for its pioneering commitment to sustainability and environmentally friendly practices, and by extending the application of the Altman Z-score model to sustainability-focused football clubs. The findings offer implications for scholars and sports administrators regarding the integration of environmental sustainability with the financial viability of sports organisations.

METHODS

Research Design

This research adopts a quantitative longitudinal case study design and scrutinises five consecutive years of financial data sourced from Forest Green Rovers FC's balance sheets and income statements. This approach allows for the observation of the development of financial sustainability. Several financial ratios involving liquidity, solvency, and operational profitability are embedded as core components of the model (Robinson et al., 2015; Brealey et

al., 2011). Financial scrutiny of Forest Green Rovers football club, in contrast, was conducted using the well-known and reliable Altman Z-score model (Altman, 2013), one of the most widely used tools in the financial assessment of football clubs. This model is also commonly used in the sports economics literature to evaluate the financial distress and bankruptcy risk of clubs in different leagues, which is the subject of the last section. This quantitative and observational design tracks financial sustainability and directly assesses financial distress and bankruptcy risk as the main outcome variables. It aligns with current risk management perspectives in sport finance. The ratios represent key dimensions of financial risk exposure-short-term liquidity risk, leverage risk, and performance risk. These feed into the revised Altman Z-Score as a single risk indicator.

Data Sources and Analysis

The financial statements of Forest Green Rovers Football Club for the last five years were used as the basis for the analysis. The data were obtained from Companies House, which is publicly accessible and published on GOV.UK (Companies House, 2025).

Liquidity Levels

Liquidity levels show the club's ability to meet short-term obligations using its current assets. They indicate whether the club has sufficient liquid resources to cover imminent payments without incurring financial distress. The main liquidity indicators are the current ratio, quick ratio, and cash ratio. These are all based on current assets, inventories, cash and cash equivalents, and current liabilities.

$$\text{Current Ratio} = \text{Current Assets} / \text{Current Liabilities}$$

$$\text{Quick Ratio} = (\text{Current Assets} - \text{Inventory}) / \text{Current Liabilities}$$

$$\text{Cash Ratio} = \text{Cash and Cash Equivalents} / \text{Short-term Liabilities}$$

Solvency

Solvency refers to the club's capacity to sustain its long-term debt obligations and maintain a stable capital structure. It reflects the extent to which the club relies on borrowed funds and its resilience to financial shocks. Solvency is primarily assessed through the debt–equity ratio and interest coverage ratio, which use total debt, total equity, operating profit, and interest expense.

$$\text{Debt} - \text{Equity Ratio} = \text{Total Debt} / \text{Total Equity}$$

$$\text{Interest Coverage Ratio} = \text{Operating Profit} / \text{Interest Expenses}$$

Operating Profitability

Operating profitability measures how effectively the club converts revenue from its core operations into profit. It demonstrates the club's cost management efficiency and economic performance. Key measures are the gross profit margin, operating profit margin and net profit margin, all relating to profit to sales.

Gross Profit Margin = Gross Profit / Sales

Operating Profit Margin = Operating Profit / Sales

Net Profit Margin = Net Profit / Sales

The Altman Z-score is based on several multiple discriminant analysis (MDA) models. The model employed in this research is the updated version of Altman's (1984) five-variable model, adapted to include four contemporary variables and revised coefficients and ratios suitable for private (non-publicly traded) and non-manufacturing (service industry) firms (Anjum, 2012). In this formulation, the market value is replaced by the book value for variable X4, thereby allowing computations for companies that are not publicly listed. The X5 variable (sales-to-total-assets ratio) is excluded to minimise industry-specific effects. This adaptive modification enhances the model's robustness across different industries (Altman, 2013). The calculation coefficients used in the model are presented as follows:

$$\boldsymbol{Z} = 6.56(\mathbf{X_1}) + 3.26(\mathbf{X_2}) + 6.72(\mathbf{X_3}) + 1.05(\mathbf{X_4})$$

$$\mathbf{X_1} = \frac{\text{Working Capital}}{\text{Total Assets}} \quad \mathbf{X_2} = \frac{\text{Retained Earnings}}{\text{Total Assets}} \quad \mathbf{X_3} = \frac{\text{EBIT}}{\text{Total Assets}} \quad \mathbf{X_4} = \frac{\text{Book Value of Equity}}{\text{Total Liabilities}}$$

This study applies the revised Altman Z-Score as an 'early warning' risk indicator, as in recent research on football club financial distress and risk governance. A company Z-score below 1.10 signals a very high short-term bankruptcy risk. A score between 1.10 and 2.60 means financial instability and likely future bankruptcy risk. A score above 2.60 shows low short-term bankruptcy risk and a sound financial structure (Altman, 1993). The model's logic and coefficients remain the same, especially in comparative analyses and financial health assessments for sports clubs.

RESULTS

This section presents the findings from the sporting performance, financial ratio analysis, and Z-score assessment of Forest Green Rovers Football Club over the past five years. Table 1 summarises the club's sporting performance during this period.

Table 1. Team performance chart for the last five seasons

Season	League	W	D	L	Pts	Rank	Result	Manager
24/25	National League; 5th Tier	22	17	7	83	3	Play-off, Remained	Steve Cotterill
23/24	League Two; 4th Tier	11	9	26	42	24	Relegated	Steve Cotterill
22/23	League One; 3rd Tier	6	9	31	27	24	Relegated	Duncan Ferguson
21/22	League Two; 4th Tier	23	15	8	84	1	Champion, Promoted	Rob Edwards
20/21	League Two; 4th Tier	20	13	13	73	6	Play-off, Remained	Jimmy Ball

W: *Win;* ***D:*** *Draw;* ***L:*** *Lose;* ***Pts:*** *Points*
Reference: (Transfermarkt, 2025).

Sporting performance-wise, Forest Green Rovers FC achieved a historic milestone in the 2021-22 season. The club secured promotion to League One, its first ever, after winning League Two. This accomplishment, alongside its environmental initiatives, was featured in a FIFA documentary. However, over the next two seasons (2022-24), the club suffered consecutive relegations, dropping to the National League. This decline coincided with managerial instability, marked by frequent changes in coaching staff, squads, and executive leadership. Such turbulence generated financial liabilities, regulatory penalties, and rising costs. These issues ultimately undermined long-term sustainability. Consequently, the club's financial performance deteriorated. In 2024, it recorded a net loss, and its net asset value turned negative due to rising costs and declining revenues.

Financial Ratio Analysis

Table 2 presents the results of the financial ratio analysis, including liquidity, solvency, and operational profitability, based on Forest Green Rovers FC's financial data over the past five years.

Table 2. General financial ratios

Ratio Types	Ratios	2020	2021	2022	2023	2024
Liquidity Levels	Current Ratio	0.47	1.08	1.12	0.60	0.24
	Quick Ratio (Acid-Test)	0.45	1.07	1.11	0.59	0.23
	Cash Ratio	0.01	0.08	0.12	0.38	0.07
Solvency	Debt to Equity Ratio (D/E)	5.19	1.50	1.10	1.11	-5.65
	Interest Coverage Ratio (ICR)	-	-	-	-	-3,087*
Operating Profitability	Gross Profit Margin (GPM)	0.36	0.36	0.34	0.21	-0.06
	Operating Profit Margin	0.12	0.23	0.00	-0.17	-0.41
	Net Profit Margin	0.12	0.23	0.01	-0.17	-0.46

Liquidity Levels

The current ratio, although above 1.00 in 2021 and 2022, dropped significantly in 2023 and worsened in 2024, reflecting a marked decline in liquidity. The quick ratio mirrored this negative trend, highlighting acute liquidity risk by 2024. Similarly, the cash ratio

remained persistently weak throughout, showing only a relative improvement in 2023, but failed to offset overall liquidity deterioration.

Solvency

Turning to solvency, the debt-to-equity ratio was extremely high at 5.19 in 2020. This elevated ratio indicated significant reliance on debt for financing. By 2024, negative equity had shifted the ratio dramatically to -5.65, reflecting the worsening financial position. Concurrently, the interest coverage ratio turned negative due to operating losses, rendering it unreliable as a financial indicator and highlighting the company's inability to cover its interest expenses from earnings.

Operating Profitability

In terms of operating profitability, the gross profit margin remained stable until 2022, after which it declined sharply. By 2024, all key profitability ratios, including net profit margin and return on assets, had turned negative, reflecting significant challenges in sustaining positive earnings. External factors also influenced performance. The COVID-19 pandemic severely impacted matchday revenues, though government support and growing commercial income helped maintain financial viability. During this period, Green Britain Group Limited emerged as the principal shareholder, prompting a strategic shift toward income diversification and cost containment. These measures improved administrative efficiency and operational performance in 2021. However, this recovery proved short-lived and failed to fundamentally alter the club's economic trajectory.

Financial Risk and Bankruptcy Analysis (Z-score analysis)

Table 3 presents the results of the Z-score analysis for Forest Green Rovers FC over the past five fiscal years.

Table 3. Z-score analysis report of Forest Green Rovers FC

Variables	**2020**	**2021**	**2022**	**2023**	**2024**
X_1	-0.43	0.04	0.06	-0.20	-0.87
X_2	-1.50	-1.59	-1.47	-2.63	-2.77
X_3	0.09	0.19	0.00	-0.28	-0.56
X_4	0.19	0.67	0.91	0.90	-0.18
Z-score	**-6.91**	**-2.94**	**-3.44**	**-10.81**	**-18.69**
Risk Class	*High Risk*	*High Risk*	*High Risk*	*High Risk*	*High Risk*

FGR's Z-score remained consistently below 1.10 across the past five fiscal years, indicating a high probability of bankruptcy in the near term. Together, the financial ratio analysis and Z-score results reveal a significant and sustained deterioration in Forest Green

Rovers FC's financial condition over the past half-decade. Declining liquidity, negative equity, and mounting operating losses have positioned the club in the highest bankruptcy risk category according to the Z-score model.

As illustrated in Figure 1, the downward Z-score trend clearly demonstrates this ongoing financial deterioration.

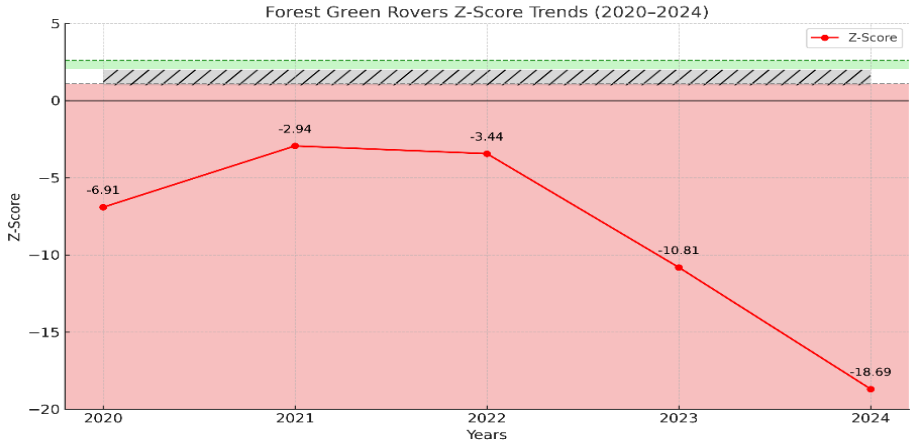

Figure 1. Z-score trends

The findings raise serious concerns about the club's long-term financial viability, despite its high-profile environmental and social sustainability. The following discussion section interprets these results in relation to existing literature and industry practices, with particular emphasis on the interplay between financial performance and non-financial sustainability dimensions in contemporary football clubs.

DISCUSSION

Sporting Volatility as a Driver of Financial Risk

Over the past five seasons, Forest Green Rovers have exhibited pronounced sporting volatility, characterised by rapid movements across league tiers. After securing the League Two title in 2021/22 and achieving promotion to League One, the club failed to sustain that level of performance in the subsequent campaign. As a result, it recorded only 6 league wins in 2022/23 and finished 24th, leading to relegation back to League Two. The downward trajectory continued in 2023/24, as the club suffered another 24th-place finish and was subsequently relegated to the National League. Meanwhile, the club is experiencing frequent managerial changes, with multiple head coaches appointed and dismissed over a relatively short period.

Taken together, the downward movement of the current, quick and cash ratios signal a progressive deterioration in the club's short-term liquidity position. This development exposes FGR to heightened rollover risk and increased vulnerability to even modest revenue shocks.

Liquidity, Solvency and Profitability as Risk Exposures

Although Forest Green Rovers' liquidity ratios for 2021 and 2022 approached more acceptable short-term levels (current ratios of 1.08 and 1.12), as indicated by Asokan (2022), they remained below the reference ranges of 2:1 for the current ratio (CR) and 1:1 for the quick ratio (QR) suggested by Fridson and Alvarez (2022). These ratios declined sharply in 2023 and even more so in 2024 (current ratio: 0.24), demonstrating that the club struggled to meet its short-term liabilities. A low quick ratio signals potential liquidity problems (Pandey, 2008), as evidenced by the club's quick ratio of 0.28. The cash ratio also failed to reach the recommended threshold of 0.5-1.0 (CFI Team, n.d.) at any point, indicating that the club's most liquid assets were insufficient to repay short-term liabilities. These figures represent a significant risk to the club's ability to meet its short-term financial commitments.

The 2020 debt-to-equity ratio was very high at 5.19, indicating the club was over-leveraged. From 2021 to 2023, these ratios stabilised within the normal range of 1.00-2.00 (Brigham & Ehrhardt, 2016), suggesting a more balanced financial position. However, since equity became negative and the ratio was meaningless in 2024, it was reported as −5.65. This indicates that liabilities exceeded assets, significantly impairing the club's financial viability (Brealey et al., 2011). Technically, this figure represents capital erosion and potential insolvency. The implications are that the club risks losing investor confidence and facing constrained credit access in the future. That same year, the interest coverage ratio declined sharply into negative territory (−3,087) due to operating losses. A negative interest coverage ratio indicates ineffective debt management (Palepu et al., 2020). In conclusion, at year-end, the club recorded both a deficit and negative equity. The club, clearly experiencing a deep financial crisis, must consider options such as capital increases, cost reductions, or restructuring.

In the solvency analysis, the financial structure risk assessment comprehensively incorporates provisions for liabilities within total liabilities. White et al. (2003) contend that these uncertain items should be included in debt measures when examining default risk, economic fragility, and potential obligations. However, some studies advocate excluding them to focus solely on interest-bearing debts or financing-related liabilities (Brigham & Ehrhardt, 2016; Penman, 2012). Thus, the approach adopted in this paper aligns with a conservative

perspective, providing a more prudential and realistic assessment of indebtedness. The spike and subsequent collapse in the debt-to-equity ratio reflect a transition from over-leverage risk to capital erosion and potential insolvency risk, indicating that the club has effectively exhausted its equity buffer.

Regarding operating profitability, the club achieved or exceeded reference averages for gross profit margin during 2020-2022. However, both operating and net profit margins turned negative rapidly from 2023 onwards. These figures demonstrate that the club operated at a loss by the end of each financial year. This trend may signal a transition from maturity to decline in the club's life cycle, consistent with Vorst and Yohn's (2018) findings. Persistently negative operating and net profit margins indicate not only poor performance but also a structurally unsustainable business model, whereby operational risk progressively converts into solvency risk.

In summary, Forest Green Rovers' financial position deteriorated markedly after 2022. Notably, in 2024, both liquidity and profitability measures reached critical levels, equity turned negative, and operating losses accelerated. This pattern aligns with the literature, which identifies such indicators as "red flags" (Fridson & Alvarez, 2022; Wahlen et al., 2015).

The literature on football club financial distress and collapse identifies several recurring themes. These include unplanned spending (purchasing too high and selling too low), high-risk investments, high-budget transfers and player wages, sudden loss of key revenue sources (club president, major sponsor), sporting failure (relegation), poor financial controls, inadequate corporate governance, fraud, and external shocks, such as pandemic, regulatory changes etc., (Evans, 2024; Beech et al., 2010; Buraimo et al., 2006). These causes largely stem from organisational short-sightedness, where sporting success is prioritised over financial stability. This vulnerability is exacerbated by the promotion-relegation system's potential to trigger a ruinous downward spiral.

Another analytical perspective examines whether Forest Green Rovers' financial and sporting performance has been influenced by its ownership model. Since acquiring the club, green energy entrepreneur Dale Vince has positioned sustainability at the heart of its vision. However, these green transformation initiatives have faced accusations of "greenwash" or "sportswashing" (Frangoul, 2023). Such practices parallel the financial mismanagement patterns noted above and raise concerns about the veracity of the club's environmental claims (Manoli et al., 2024). Vince's limited sports management experience, combined with the ownership structure's distinctive management approach, may have contributed to the club's

financial difficulties and sporting volatility. Research has identified an inverted U-shaped relationship between ownership structure and club performance (Acero et al., 2017). This ownership model concentrates strategic and financial risk in a single principal investor, creating classic "key-person risk" and heightening dependence on external capital to sustain green initiatives. From a risk-management perspective, FGR's sustainability strategy thus exhibits high impact but low resilience should the primary sponsor withdraw. Consequently, the complex interplay between sustainability discourse, greenwashing allegations, financial constraints, and sporting fluctuations may originate from the club's distinctive ownership structure.

Z-score Analysis as an Early-Warning Risk Indicator

Since 2013-14, Forest Green Rovers FC's Z-scores over the past five years indicate, according to Altman's model, financial distress and bankruptcy risk. All Z-scores across these five years remain heavily negative (ranging from -6.91 to -18.69), consistently placing the club in the bankruptcy zone under continuous financial monitoring. From a risk-governance perspective, sustained Z-scores below 1.10 suggest that FGR operates in a state of continuous financial distress rather than experiencing temporary shocks. This finding aligns with recent evidence that many European clubs persist in a sustained 'high-risk' zone despite revenue growth, underscoring the need for early-warning systems and proactive risk mitigation.

Hacker (2025b) reports that the core of Forest Green Rovers' financial crisis stemmed from promotion-related expense increases that proved unsustainable upon relegation to the lower tier. Early in the 2022-2023 season, elevated League One broadcasting and sponsorship revenues were accompanied by higher costs. However, relegation at season's end created a catastrophic revenue-expense imbalance. This pattern exemplifies the irrational expenditure phenomenon driven by excessive promotion motivation, as described by Szymanski (2012) in his analysis of English football clubs.

As is evident, these drastic losses are directly attributable to the club's relegation and the consequent decline in revenue sources. This finding corroborates Szymanski & Weimar (2019), who identify unexpected sporting failures, particularly relegation, as the primary determinant of bankruptcy risk for professional clubs in German football leagues. Relegated teams experience significantly diminished revenue-earning potential, with decreased attendances negatively impacting matchday revenues. Given Forest Green Rovers' current participation in the National League (Tier 5), broadcasting and other revenue disbursements will be substantially lower than those in professional leagues from League Two upwards

#Non_league. Another critical factor, as previously noted by Evans (2024) and Buraimo et al. (2006), concerns excessive player wage costs. Player wages typically constitute the largest expense for professional football clubs, often involving fixed-term contracts without relegation clauses that allow salary reductions or termination. With revenues declining and wage costs remaining "sticky" due to contract lengths, relegation represents the core mechanism linking sporting volatility to financial distress.

Plans for a new stadium (Eco Park), a £100m megaproject led by the club chairman and Ecotricity, have been underway since 2019 (Garcia, 2024). Financial reports reference this project, with corresponding depreciation charges recorded. While the project exerts significant pressure on the balance sheet, external funding support mitigates the burden on the club's operational income (Ecotricity, 2022). Thus, assessing the club's financial instability solely based on this investment would be misleading. Nevertheless, the stadium's unique contributions to sustainability warrant emphasis. Cayolla et al. (2023) demonstrate a relationship between fans' pro-environmental behaviours and clubs' sustainability initiatives. Similarly, sports clubs' environmental policies appear linked to enhanced team identity (Delia et al., 2024). Consequently, these environmental sustainability efforts not only capitalise on supporter engagement but also promote broader societal benefits by encouraging environmentally responsible behaviours among fans. However, partial recognition of this investment through balance sheet deductions and depreciation has exacerbated reported losses. Overall, despite Forest Green Rovers' strong environmental identity, creativity, and community engagement, its financial viability and sporting success lag behind. This disparity underscores that modern sports management requires financial and sporting sustainability to underpin environmental initiatives. These findings align with ecofeminist perspectives, which assert that organisational transformation demands deep structural integration of ecological, social, and economic concerns rather than their isolation or hierarchisation (Samuel & McGouran, 2024). The club's challenges illustrate that traditional borrowing practices must be balanced with ethical and financial sustainability, consistent with emerging macro-marketing research. As Yarrow and Kranke (2016) indicate, sports sustainability tools serve not merely monitoring functions but constitute comprehensive, transformative approaches. While FGR excels in green investments and social sustainability, these achievements partially obscure critical lessons from its financial statements. Characterising FGR as a model sustainable club would therefore be premature.

In summary, this case demonstrates that without robust risk governance, encompassing identification, assessment, mitigation, and monitoring, even exemplary environmental initiatives can coexist with an unsustainable financial risk profile.

CONCLUSION

This study applied the revised Altman Z-score model to assess Forest Green Rovers FC's financial stability and bankruptcy risk over the last five fiscal years, despite its global recognition as "the world's greenest sports club." Although the club has pioneered environmental initiatives such as 100% renewable energy, zero-waste policies, recycled kits, and vegan menus, it has faced key risk factors since 2022: mounting operating losses, negative equity, capital write-downs, infrastructure depreciation, and insufficient commercial revenue growth. These challenges have resulted in persistently low Z-scores, signalling a shift from temporary underperformance to sustained financial distress. Additionally, concentrated ownership under Green Britain Group elevates both key-person risk and the potential impact of sponsor withdrawal. While sustainability enhances brand value, sustained sporting success is critical for revenue viability, highlighting a fundamental tension between environmental leadership and financial sustainability in contemporary football clubs.

Theoretical Implications

This study reframes the revised Altman Z-score as an integrated risk indicator for eco-oriented football clubs, extending the literature on sport finance, sustainability, and risk management. The results show that eco-focused operational costs and expectations of long-term returns can threaten economic sustainability if not managed effectively.

Policy and Governance Implications

The findings suggest the importance of enhanced financial transparency and risk-based oversight in professional football governance. Leagues and federations could consider mandating reporting of standard distress indicators, scenario analyses, and disclosure of sustainability initiative financing and monitoring. Such measures could support more resilient governance for environmentally ambitious clubs, balancing symbolic commitments with long-term financial resilience.

Limitations and Future Studies

This single-case analysis of Forest Green Rovers FC limits generalisability to other clubs, despite its exemplary sustainability profile. Future studies might investigate:

- Examine sustainable sports organisations through strengthened risk-governance frameworks.
- Conduct comparative analyses of clubs from other leagues to assess the relationship between environmental sustainability investments and financial stability.

Data Availability

The data sources used in this study were obtained from publicly accessible databases (Companies House, GOV.UK). https://find-and-update.company-information.service.gov.uk/company/06748691

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