THE INFLUENCE OF VAR IN FOOTBALL

Analyzing Fan Perspectives

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DECLARATION

I, Nikhil Sankar declare that this research article is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of MSc Business Analytics in the University of Northampton, Waterside Campus. It has not been submitted before for any degree or examination in this or any other university.

Signed by: Nikhil Sankar

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ABSTRACT

The introduction of Video Assistant Referee (VAR) technology in football aimed to enhance decision-making accuracy and reduce refereeing errors. However, its implementation has generated widespread debates among stakeholders, particularly fans, who perceive VAR as both beneficial and disruptive to the sport. This study critically assesses the impact of VAR on football, with a particular focus on fan perceptions, match enjoyment, and game flow.

The research employed a mixed-methods approach, utilizing secondary data from the YouGov 2020 VAR survey, which gathered responses from 4,154 UK football fans. The data was analysed through statistical methods, including correlation analysis, regression models, and thematic insights. Findings indicate that while VAR improves refereeing accuracy, it significantly disrupts game pace, leading to frustration among fans. The study also highlights demographic differences in VAR acceptance, with younger fans preferring quicker decisions and older fans prioritizing accuracy.

Results suggest that fans do not entirely reject VAR but advocate for improvements in its application, particularly regarding transparency, decision-making speed, and communication. The study's implications extend to football governing bodies, emphasizing the need for VAR modifications to align with fan expectations. Recommendations include enhanced referee training, real-time communication of decisions to fans, and a potential VAR betting application to increase engagement during review stoppages.

Limitations of the study include its reliance on secondary data, which may not capture evolving sentiments on VAR, and the regional focus on UK football fans, limiting generalizability to global football audiences. Future research should explore the psychological and emotional impact of VAR on players and fans, as well as comparative studies across different leagues. This study contributes to the ongoing discourse on technology in sports officiating, providing insights into how VAR can be refined to enhance fairness while preserving the excitement of football.

INTRODUCTION

Background

Refereeing football is a tough job that calls for making snap decisions under pressure. Referees frequently cope with limited visibility while analysing complex, fast-paced in-game situations involving many players (Lex, Essig, Knoblauch & Schack, 2015). To improve decision-making precision and reduce mistakes, the Video Assistant Referee (VAR) system was implemented. VAR's implementation, however, has generated criticism; some contend that it has increased ambiguity as much as it has clarity (Ogden, 2017). With millions of participants and billions of supporters globally, football is undoubtedly the most popular sport in the world (Muller, Simons & Weinmaan, 2017). The sport is frequently referred to as "the world's game" and is sometimes referred to as either football or football (Pifer et.al., 2018). Referees and their helpers are supposed to enforce the game's regulations while making sure that judgements are made promptly and accurately, making them one of the most important components of football (Marcio et.al., 2021). The implementation of VAR technology was intended to decrease errors and improve fairness in football officiating in response to long-standing concerns with refereeing

anomalies (Samuel et.al., 2020). However, because human judgement is still a crucial component of the review process, VAR has not completely resolved disputes despite its stated goal. Historical officiating scandals, such the notorious "Wembley Goal" in the 1966 FIFA World Cup final, increased the call for VAR. Despite continuous disagreements on whether the ball had crossed the line, this contentious call gave England a goal. Calls for the use of technology in football officiating have grown because of these instances (Winand et.al., 2021). To help referees make decisions, VAR shows them slow-motion replays (Mather & Breivi, 2020). Although the technology was supposed to increase accuracy and fairness, it has sparked fresh arguments among football fans, many of whom contend that it interferes with the game's flow and diminishes football's spontaneity (Kolbinger & Knopp, 2020).

Significance of the Study

With a sharp rise in both involvement and attendance, the global sports sector has experienced tremendous change in recent decades (Ugondo & Tsokwa, 2019). Football has grown quickly, and its commercial success is greatly attributed to its supporters. Fans are more involved and emotionally invested in teams, players, and leagues, whereas spectators are generally defined as people who watch games (Trial, Robinsin, Dick & Gillentine, 2003). Through media consumption, ticket sales, and item sales, football fans are regarded as a vital resource that supports the sport's financial viability (Duan, Liu & He, 2019). Football is the most popular sport in the world, with an estimated four billion fans worldwide (Kesslar, 2018). With over 70% of the UK population watching during the 2018–19 season and 3.2 billion viewers worldwide, the English Premier League (EPL) is one of the most watched leagues (Carp, 2019). Football fans' views of fairness and match enthusiasm have been significantly impacted by the implementation of VAR technology.

Research Aim and Objectives

This study aims to critically assess the impact of Video Assistant Referee (VAR) technology on football, focusing on its effectiveness in improving decision-making, its influence on fan engagement, and its broader implications for the sport.
The specific objectives of this research are to:

1. Evaluate the effectiveness of VAR in reducing refereeing errors and ensuring fairness in football.
2. Examine fan perceptions of VAR technology, including its impact on match enjoyment and engagement.
3. Analyse the impact of VAR on the pace and flow of football matches.

Research Questions

To achieve these objectives, the following research questions will be explored:

1. How do fans perceive the role of VAR in enhancing fairness and decision-making accuracy?

2. What are the key concerns fans express about the impact of VAR on game flow and enjoyment?
3. To what extent do demographic factors (e.g., age, region, and football engagement) influence fan opinions on VAR?
4. What recommendations can be made to improve the integration of VAR in football?

Structure of the Dissertation

This dissertation is structured as follows:

- ➢ Introduction: Provides an overview of the study, discussing the implementation of VAR in football, its impact on decision-making, fan perceptions, and the study's objectives.
- ➢ Literature Review: Explores previous research on VAR technology, its effects on refereeing, and how it influences fan engagement and match dynamics.
- ➢ Industry Context: Analyses the role of VAR within the UK football industry, including its adoption in the Premier League, fan sentiment, and betting culture.
- ➢ Methodology: Details the mixed-methods approach, describing the research design, secondary data analysis, and the development of a VAR betting application prototype.
- ➢ Findings and Analysis: Presents the statistical results and key insights on fan opinions about VAR, including its accuracy, transparency, and impact on match enjoyment.
- ➢ Discussion: Interprets the findings, linking them to research objectives and existing literature to assess VAR's broader implications for football.
- ➢ Ethics: Addresses the ethical challenges of implementing VAR, focusing on justice, fairness, transparency, and fan inclusivity.
- ➢ Recommendations: Suggests strategies to improve VAR, including transparency in decision-making, referee training, and enhancing fan engagement during reviews.
- ➢ Conclusion: Summarizes the study's key findings, acknowledges limitations, and proposes directions for future research on VAR in football.
- ➢ References: Lists all the scholarly and industry sources cited in the dissertation.
- ➢ Appendices: Includes supplementary materials such as survey instruments, codes used for programming languages, detailed data, or additional case studies for reference.

LITERATURE REVIEW

Introduction

This chapter explores how technology has emerged in football, with a focus on how it affects refereeing calls, match dynamics, and spectator views. It looks at current arguments about VAR and referee bias as well as historical factors like the emergence of sports broadcasting rights and performance analytic techniques. The assessment, which draws from research that examines social media sentiment and stadium behaviour trends, delves deeper into how fans respond to VAR. In the end, this review offers a thorough grasp of the ways in which football technology impacts the spectators, shedding light on its advantages, drawbacks, and potential areas for development. For football's regulating organisations, striking a balance between entertainment value and accuracy is still a major challenge as technology advances.
Since social media has become so common, researchers now have more opportunity to examine sentiment and rapid reactions during or related to events. A study trained two tree-based classifiers to analyze text corpora: one designed to detect tweets related to VAR and another to assess the sentiment expressed in each tweet. A novel gradient boosting technique was employed to analyze the content of 643,251 tweets from 129 games, including 94 VAR-related events. The findings indicate that VAR predominantly influences negative sentiment expressions on Twitter (Kolbinger and Knopp, 2020). In conclusion, these studies offer compelling evidence that the video assistant referee disrupts the spectator experience, which is consistent with our findings. As such, the relevant football associations, in our example the English Premier League, should be aware of this.

Emergence of Technology in Football

Sport typically aims to make life easier and more comfortable, which is not what technology is meant to do in a sport (Hilvoorde & Vos, 2007). The definition most employed in articles about technology in sports is that of technology as a "human made means to reach human interests and goals" (Loland, 2003). But according to Ihde and Zorn (1994), technology is a monolithic force that may be understood as an "intentional understanding-relation with things." A common thread among the opinions of the scholars is that technology in sports serves as a tool to accomplish objectives that would otherwise be impossible. Football's ardent supporters and emotional core make it the most popular sport in the world (Shvili, 2020). The claim is that using technology slows down decision-making and disrupts the game's rhythm. Frequent pauses are tiresome, detract from the game's enjoyment value, and exhaust players (Ryall, 2012). The guiding principle, according to, is to play the game with technology as closely as possible to the game without it (Tamir & Bar-eli, 2021). It is important to note that most technical teams today use performance analysis software, which enables the study and evaluation of both quantitative and qualitative data at every stage of the game (Video Observer Blog, 2013).

The BBC and ITV spent £2.6 million broadcasting English football between 1983 and 1985. This skyrocketed in 1992 when Sky paid £38 million a year to bid on 60 Premier League games. This then rose dramatically between 2001 and 2007, when Sky spent £2.2 billion on many games.

After that, Sky and BT agreed to pay a total of £5.3 billion to broadcast live Premier League matches from 2016 until the 2018–19 season (Hunt, 2017). The distribution of revenue and costs, rather than the difference between total revenue and expenditures, is frequently the source of unproductive transactions. They also discover a correlation between result uncertainty and product demand. As a result, individuals are more invested in and interested in less predictable sports. The significance of sports culture, where demand for sports marketing is driven by celebrity athletes, was overlooked by these researchers (Gratton and Solberg, 2007).

The human eye can only process about 16 pictures per second, so the ball must be behind the line for at least 60 milliseconds. This presents a dilemma for referees. The human eye cannot tell whether the ball has crossed the line because, in certain situations, it is just behind the line for a few milliseconds before a player kicks it back or it bounces back into the field of play (Prayag Shah R. M., A Review Paper on Goal-Line Technology, 2014). While evaluating foul play, assistant referees committed 13% more offside errors than top international referees (14%). Referees placed 11 to 15 meters away, however, decreased their error rate. A 46–60 degree viewing angle increased decision accuracy, but the offside line position had no influence on errors. Due to spectator pressure and weariness, mistakes surged in the closing minutes of games. Each match involves referees covering 11 km, including 900m at high speed, making match play extremely taxing on the body (Weston, 2012). Referee evaluations must take player mobility into account because studies indicate a correlation between officials' performances and players' actions. Dr. Paul Hawkins created Hawk-Eye technology in 2001, which uses 14 high-speed cameras to monitor the ball (Luan, 2014). Whether the ball has completely crossed the goal line is determined by a 3D model, and the referee's watch instantly receives the results. This technology improves the viewing experience while guaranteeing fairness and accuracy (Harrod Sport, 2018).

Video Assistant Referee

Referees can alter or influence judgements with the help of VAR, a live technology assistance system (Flores, 2018). With the use of many TV monitors, this technology allows an off-field video assistant referee (VAR) in a video operation room (VOR), along with an assistant VAR (AVAR) and a replay operator (RO), to evaluate on-field occurrences (IFAB, 2018). To help the on-field referee make choices that are challenging to make in real time, a variety of visualisations offer multiple perspectives of an occurrence (Flores, 2018). Prior to the EPL's adoption of VAR, the system was tested extensively in several leagues and competitions throughout the world (Flores, 2018; McMahon, 2024). The first trial occurred in August 2016 in the United Soccer League in the United States during a game between the New York Red Bulls II and Orlando City B, two MLS clubs' reserve teams (Platt, 2023). VAR was initially designed to assess only those instances that were critical to the game's outcome (Bacigalupe, 2020). When VAR first started, it was only intended to be used in cases when there were blatant referee errors, not for circumstances that were ambiguous or up for debate (Bacigalupe, 2020). VAR is currently used in the Premier League to review decisions regarding goals, penalties, red card offences, fouls, and mistaken identity when a card is awarded (IFAB, 2018). The process of reconsidering a decision that might go either way has amplified the impact of using VAR. A decision may be recommended or confirmed by the VAR team within the VOR, or the on-field

referee may request a review after rendering a decision (IFAB, 2018). If a blatant mistake is made, the off-field VAR promptly alerts the on-field referee, who can then promptly reverse the first ruling based on the VAR's recommendations (IFAB, 2018). Similarly, on-field officials have the option to stick with their original ruling or examine the incident themselves on a touchline monitor. The VAR system is viewed by many football stakeholders and supporters as the solution to resolve disputes in refereeing decisions (Flores, 2018).

The VAR Protocol

The International Football Association Board (IFAB) introduced the Video Assistant Referee (VAR) Protocol to enhance fairness in football officiating by correcting significant errors in match-defining situations. The system operates on the principle of "minimum interference, maximum benefit," ensuring that while crucial decisions are corrected, the natural flow of the game remains unaffected. VAR interventions are strictly limited to four key scenarios:

1. Goal Decisions – Reviewing potential infractions such as handball, offside, or fouls before a goal.
2. Penalty Decisions – Assessing possible fouls, handballs, or diving incidents to ensure accurate penalty rulings.
3. Direct Red Cards – Evaluating serious offenses, including violent conduct or denial of a goal-scoring opportunity.
4. Mistaken Identity – Ensuring disciplinary actions are issued to the correct player.

The VAR review process consists of four stages: (1) The on-field referee makes an initial decision; (2) The VAR team analyses the footage; (3) If an error is detected, the referee is either advised to change the ruling or conduct an On-Field Review (OFR); (4) A final decision is made. The referee maintains ultimate authority, as only match officials can request reviews. To address fan concerns over delays, IFAB emphasizes efficiency and transparent communication. While VAR has improved officiating accuracy, subjective interpretations still spark debate. IFAB aims to balance decision-making precision with football's entertainment value (IFAB, n.d).

Researchers now have more opportunity to examine sentiment and quick reactions during or connected to events thanks to the extensive usage of social media. To train two tree-based classifiers for text corpora—one to detect tweets linked to the VAR and another to score a tweet's sentiment—we used a new form of a gradient boosting technique to analyse the content of 643,251 tweets from 129 games, including 94 VAR events. In conclusion, our findings demonstrate that the VAR primarily influences negative sentiment expressions on Twitter. In conclusion, these studies offer compelling evidence that the video assistant referee disrupts the spectator experience, which is consistent with our findings. As such, the relevant football associations, in our example the English Premier League, should be aware of this (Kolbinger & Knopp, 2020).

VAR Process

The VAR procedure is clearly laid out. A certified human referee who watches the game on monitors is known as the VAR. Using an in-ear speaker and a microphone, the on-field referee and VAR can converse with one another. The field of play is next to the referee review area (RRA). Here, a video monitor allows the on-field referee to view an occurrence (Kubayi et al., 2021). The Video Operation Room (VOR), which may be off site or on-site, facilitates the replay. The evaluation process cannot be interrupted by a coach or player. Goals, penalty decisions, direct red-card events, and mistaken identification are the four match-changing situations in which VAR is only utilised for "clear and obvious errors" or "serious missed incidents." The "clear and obvious" rule does not apply to factual determinations such as offsides or whether a player is inside or outside the penalty area. The referee notifies the VAR that a subjective judgement needs to be reviewed, or the VAR finds a "clear and obvious error" in one of the four scenarios that could change the outcome of the game. The referee will examine the tape during the subsequent pause in the contest before play resumes. The VAR has the authority to suggest a modification or even rescind the decision if it disagrees with the on-field referee. The on-field referee could make a final decision without consulting the VAR if the advice given by the VAR is within the referee's control. In summary, the system gives the on-field referee the chance to see a video of on-field situations and get guidance from the VAR when there is a "serious missed incident" or a "clear and obvious error." The final call is always seen as being made by the on-field referee (Pashaie et al., 2023).

Perceptions of VAR in the football world

Not everyone has been a fan of VAR technology. The perception of VAR among Premier League football supporters was examined by (Scanlon et al., 2022). The main issues raised by fans were lack of transparency, accuracy, destroying the moment, and loss of flow or consistency. Managers of Premier League teams are more likely to openly support VAR when rulings benefit their side and to doubt its usefulness when rulings don't (Chen & Davidson, 2021). Supporters thought that VAR rulings at the 2018 FIFA Men's World Cup benefitted teams from the Global North.

The ultimate goal of the game is excitement, which is comparable to the goal of life in general. "The lack of clarity regarding the referee's arbitrary decision gave us hope that maybe one day we too will be good," he says in his post about the game's great life parable. This emotion suggests a deliberate preference for injustice, purely to provide the underprivileged party the hope that the judge would make an error (Galily, 2024).
After being introduced by some national leagues the year before, the VAR was finally accepted and formally adopted in 2018 despite early opposition from FIFA, the central regulatory body of football. Similar to the introduction of yellow and red cards in the 1970s, the VAR is largely considered a significant turning point in the history of football refereeing (Zglinski, 2020).

In fact, the multibillion-dollar football industry has been significantly impacted by the use of VARs. With teams, leagues, broadcasters, advertisers, and fans all having significant financial stakes in the game, football is the most watched and popular sport in the world. Furthermore,

VARs are thought to improve the sport's legitimacy and give spectators a more interesting and fulfilling experience. They contribute to preserving the faith and allegiance of fans who devote their time, resources, and feelings to cheering on their preferred teams and athletes. The VAR seeks to reduce human error and guarantee that important decisions are founded on more thorough information by using video replays and different camera viewpoints (Galily, 2024).

Despite having access to numerous camera angles and replays, VAR rulings are frequently nonetheless subjective and spark arguments. Even when there is video evidence, interpretation still plays a part and leads to contentious decisions. The lack of transparency is a big issue since players, coaches, and fans are left in the dark regarding decisions because the referee and VAR crew do not communicate with viewers. This opacity increases scepticism and irritation. VAR's frequent assessments, according to critics, break the momentum and lessen the excitement of matches (Collins, 2019). A game's outcome can be significantly changed by goals that are disallowed or penalties that are given after review. Furthermore, delays have a detrimental effect on fan engagement, particularly for stadium attendees who could become estranged from the live experience due to their inability to view the same replays as TV viewers. Allegations of referee bias continue despite VAR's goal of impartiality; some people think that decisions favour particular players or teams, which fuels debate and mistrust about its application. The limited time available for communication between VAR referees and on-field officials can sometimes impede effective information exchange. VAR reviews require swift decision-making to minimize disruptions to the flow of the game (Galily, 2024).

Fan opinions on VAR

Football fans have a deep and emotional bond with the entities that create the content they watch and listen to (Samra and Wos, 2014). A fan is a consumer of organised sports and can take many various forms based on their level of dedication (Hunt et al., 1999). Sport organisations value devoted fans more than casual spectators because the former will invest more time and money in following their sport, team, or athlete, while the latter will spend less and feel less attached to a particular entity in sport (Mastromartino et al., 2017). Because there would be no demand for broadcast sports without fans, and because it would be hard for sport clubs to get sponsors if no one was watching their product, fans are the most crucial consumer group for a sport club's business (Da Silva and Las Casas, 2017). Sport organisations must have a thorough understanding of fan behaviour in order to adapt to the changing demands and desires of sports fans (Dwyer et al, 2016). According to fan experience research, when fans are evaluating their personal in-stadium experience, noise and crowd size are the most crucial elements (Wilkie, 2008). However, new studies on crowd experience must take these aspects into consideration as more elements that could impact crowd experience are incorporated into sport, such as decision aid technology. The adoption of decision-aid tools like Goal Line Technology (GLT) may lessen the atmosphere by taking away the fun that supporters get from discussing controversial goals (Singh, 2012).
A study looked at the connection between football match goers' feelings, contentment, and behavioural goals. Results were gathered using a structural equation model and a survey given to Portuguese Super Liga fans. There were 22 emotions in this model, and the items that scored the highest were chosen for additional examination. 'Anxiety,' 'Dejection,' 'Anger,' and 'Joy' were

among these feelings; nevertheless, passion, which is prevalent in other literature, was absent. The results demonstrated that happiness was the only emotion that positively impacted both satisfaction and behavioural intentions (Biscaia et al., 2012). To incorporate his personal recollections and experiences, he also took a narrative technique. The anecdotes "represent an invocation of emotions that are now indelibly associated with specific football grounds at particular times" (Bairner, 2014). Pressure from the fans is one of the primary causes of referee prejudice when it comes to penalties. Another way to perhaps spot referee bias is through penalties. According to research conducted on German Bundesliga games during the 2000–2001 season, home clubs received penalties 81% of the time they were due (Sutter & Kocher, 2003). Conversely, just 51% of penalty kicks were awarded to the away clubs. The referees therefore failed to indicate the penalty mark in half of the occasions in which they had every reason to do so. Referees typically favour the home team when giving penalty kicks, according to another study on the Bundesliga's 12-year history. When the home team was behind by one goal, the most contentious and even incorrect penalties were given. This might be seen as support for the idea that the referees made a conscious effort to save the home teams from losing (Garicano et al., 2001).

They anticipated that the VAR system would reduce referee errors to a minimum and lessen the frequency of scandals, if not completely eradicate them as a phenomenon. Nevertheless, four years of the system's operation have demonstrated that, despite the ability to thoroughly examine any circumstance in the match using video, the referees still make contentious and often downright incorrect choices. The English Premier League encounter between Everton and Manchester City, in which the visitors prevailed 1-0, caused a great deal of controversy in March 2022. The ball struck the defender's hand while it was in the "City" penalty area during play. A punishment ought to have been imposed in accordance with the regulations. Referee Paul Tierney, however, chose not to give a penalty kick after watching the game and speaking with a VAR colleague. Following the game, Everton received an official apology from the English Football Association, which acknowledged that this judgement was incorrect. Manchester City defeated Liverpool by one point to win the English championship on May 22. The outcome of the tournament might have been changed if there had been a clear refereeing error (Gasparetto & Loktionov, 2023).

Summary

The literature review highlights the increasing role of technology in football, focusing on refereeing accuracy, game dynamics, and fan perceptions. Historically, sports broadcasting and performance analysis software have shaped the sport's economic and competitive landscape. The rise of VAR and Hawk-Eye technology has further revolutionized officiating by enhancing decision-making accuracy and reducing human error. However, concerns persist regarding subjectivity, game disruptions, and transparency. VAR has sparked controversy due to delays in decision-making, lack of communication with fans, and continued subjective interpretations. Fan sentiment analysis suggests that many supporters view VAR as disruptive, affecting their engagement and enjoyment of live matches. While some fans appreciate its role in enhancing fairness, others believe it diminishes the excitement and spontaneity of football. The review concludes that football technology must strike a balance between accuracy and entertainment.

Although VAR have reduced errors, ongoing improvements are necessary to enhance transparency, speed up decision-making, and improve fan communication. Future research should explore the emotional and psychological impact of VAR on players and fans, ensuring that football remains both fair and engaging.

INDUSTRY CONTEXT

Introduction

The integration of technology into football has revolutionized the sport, influencing refereeing decisions, match dynamics, and fan engagement (Collins, 2022). The introduction of the Video Assistant Referee (VAR) in leagues worldwide, particularly in the English Premier League (EPL), has been a significant development aimed at enhancing fairness and accuracy in decision-making (IFAB, 2023). However, VAR has also sparked debates concerning game flow disruption, transparency, and fan experience (Scanlon et al., 2023). This chapter explores the UK football industry, focusing on VAR's impact on fans, the betting culture, and comparisons with other leagues. Additionally, it evaluates how fan frustration with VAR reviews could be mitigated through a VAR betting application, aligning with the UK's established sports betting market (Gainsbury et al., 2023).

Overview of the UK Industry

Football is the most popular sport in the UK, with the EPL being one of the most commercially successful leagues globally (Premier League Financial Report, 2023). The league attracts millions of spectators, both in-stadium and through broadcasting rights (Hunt, 2022). With clubs generating billions in revenue, football has a profound economic and cultural impact on the nation (Andrews & Harrington, 2023). Historically, refereeing decisions have been a contentious issue, leading to the adoption of VAR to improve officiating accuracy (FIFA, 2022).

VAR in the Premier League

VAR was introduced in the 2019-20 EPL season to reduce officiating errors in match-defining situations (IFAB, 2020). The system assists referees in reviewing goals, penalty decisions, direct red cards, and mistaken identity (Mather, 2023). Despite its intent, VAR has faced criticism over time delays, subjective decisions, and lack of communication with fans (Bradley, 2023). This has led to mixed reactions among football stakeholders, especially spectators who feel detached from crucial refereeing decisions (Scanlon et al., 2023).

Fan Sentiment on VAR - YouGov 2020 Survey

Analysis of the YouGov 2020 survey on VAR in the EPL provides insights into fan opinions (YouGov, 2020). The dataset, comprising 4,154 UK football fans, asking key questions such as:

1. How often, if at all, do you watch men's English Premier League football matches, either on television or live at a stadium?

2. How well or badly would you say VAR has worked in the Premier League?

3. Thinking about the use of VAR in the English Premier League so far in the 2019-2020 season...If you were to give VAR a mark from 0 to 10 on how well or badly it's worked so far, with 0 being a complete failure and 10 being that it has worked perfectly, what mark would you give?

4. Overall, how much more or less enjoyable has VAR made watching Premier League football matches, or has it made no difference?

5. What would be your preference on the future use of VAR in Premier League football matches?

6. A time limit on how long it can take for decisions to be made using VAR?

7. Being able to see the video footage that the video assistant referees are being shown to make their decision?

8. In general, do you think VAR has improved or worsened the quality of football played?

9. Accuracy of referee's decisions?

10. In general, do you think VAR has improved or worsened Pace of the game?

Questions were focused to address specific fan concerns such as:

1. Game delays: Many fans express frustration over prolonged VAR checks disrupting the rhythm of play.

2. Lack of transparency: In-stadium spectators lack access to VAR communications, unlike TV audiences who receive commentator explanations.

3. Subjectivity in decisions: Despite technological assistance, some calls remain controversial.

Demographic Breakdown

1. Older fans tend to resist VAR, preferring traditional refereeing methods.

2. Younger fans are more accepting, though they emphasize the need for quicker decisions.

3. Club affiliations influence perception, with fans often perceiving decisions as biased against their teams.

UK's Betting Culture

The UK has one of the largest football betting industries globally, with in-play betting being a dominant trend (Gainsbury et al., 2023). Fans frequently place bets on Goals, penalties, red cards, offsides, and match outcomes (UK Gambling Commission, 2023).

Proposed VAR Betting App – Enhancing Fan Engagement

This study proposes a VAR betting application as a solution to fan frustration. The app allows fans to:

1. Bet on VAR decisions in real-time, making reviews more interactive.

2. Increase engagement during delays, turning waiting periods into an entertainment opportunity.

3. Align with the UK's betting culture, integrating a familiar activity into the VAR process.

Summary

This chapter explored the UK football industry, focusing on VAR's impact on fans, the betting culture, and comparisons with global implementations. The YouGov 2020 survey data provided insights into fan frustration with VAR, particularly around delays and transparency (YouGov, 2020). The chapter also introduced a VAR betting application as a potential solution, aligning with the UK's established football betting market (Gainsbury et al., 2023). Comparisons with Bundesliga, La Liga, and FIFA tournaments suggest that the EPL can improve VAR implementation through enhanced communication and quicker decision-making processes (Müller & Schmidt, 2023). As football technology evolves, striking a balance between fair officiating and maintaining fan engagement remains a critical challenge (Collins, 2022). Further research about this chapter can be found in Appendices K, L, M, N, O and P.

METHODOLOGY

Introduction

This chapter outlines the methodology used in this study, detailing the research philosophy, approach, design, data collection, and analysis methods. The primary aim of this chapter is to provide a systematic and structured approach to the research process, ensuring reliability, validity, and ethical considerations. This study investigates fan perceptions of VAR and AI in football using a mixed-methods approach, leveraging both qualitative and quantitative data to derive insights from a secondary dataset. Additionally, this research explores the development of a VAR betting application as a potential solution to improve fan engagement and reduce frustration associated with VAR delays.

Research Philosophy

1. Ontology

Ontology refers to the nature of reality in research. In this study, reality is viewed as socially constructed, particularly in how fans perceive VAR and AI in football. Various studies have demonstrated that fan reactions to VAR are subjective and influenced by emotions, suggesting an interpretivist stance.

2. Epistemology

Epistemology concerns how knowledge is acquired. Given the study's focus on fan perceptions, a pragmatist approach is employed, aligning with positivism through quantitative sentiment analysis. This approach ensures statistical validity in assessing fan reactions while maintaining an objective analytical framework.

Research Approach

This study adopts a deductive approach, testing existing theories on VAR's impact on fan experience. Since secondary data from YouGov's 2020 VAR survey is used, patterns in responses are analysed against pre-existing literature on technology and officiating bias in football. The research also incorporates an exploratory component, proposing a VAR betting application as a potential solution to address fan dissatisfaction.

Research Design

The research follows Quantitative analysis like statistical patterns, Likert-scale responses, and sentiment classification. Also, applied research is used for the development of a prototype VAR betting application to address fan engagement concerns.

Research Setting and Participants

This study uses secondary data from YouGov's 2020 VAR survey, which collected responses from 4,154 UK football fans. The sample includes diverse demographics such as age, gender and region, allowing for cross-sectional analysis of fan opinions. Additionally, an experimental component is introduced through the development of a dummy VAR betting app, which is designed to enhance engagement and mitigate frustrations associated with VAR stoppages.

Data Collection and Analysis procedure

Since this research relies on secondary data, no new questionnaires were developed. The YouGov dataset includes structured survey questions focusing on fan sentiment toward VAR, perceived fairness, and emotional impact. Data was collected via survey responses, structured into Likert-scale and multiple-choice. This dataset enables a comparative analysis across

various demographics and sentiment trends. The data has been cleaned using Microsoft Excel and derived a consolidated dataset, which was processed using Python, SPSS, Tableau, and Excel to extract insights. Furthermore, data regarding the usability and potential adoption of the proposed VAR betting application was documented. A dummy application website and an APK file were developed to test the feasibility of a VAR betting app.

Quantitative Analysis was carried out using SPSS and Python for Descriptive statistics, regression analysis, and correlation tests. Python, Tableau & Excel was used for visualization of trends and plots.

To address fan frustration due to VAR delays, a prototype of a VAR decision betting application was developed. This application aims to engage fans during VAR reviews by allowing them to predict the outcome of decisions and for improving their overall match experience. The application was developed using an Agile methodology, allowing for iterative improvements based on frequent testing. Each sprint focused on refining user experience, ensuring seamless functionality, and integrating dummy betting mechanics. The front-end of the application was developed using HTML and CSS for a responsive UI, while the backend was built with JavaScript to handle dummy betting functionality and Netlify was used for hosting the website.

Reliability and Validity

Reliability ensures consistent results. The study employs a Likert-scale questionnaire, where Cronbach's Alpha measures internal consistency, ensuring survey responses are statistically reliable. Additionally, working of VAR betting application prototype usability testing is ensured through deployment through Netlify. Validity measures whether the research accurately assesses fan perceptions of VAR. Face validity is ensured by using a widely recognized dataset, while construct validity is established through quantitative analysis. The feasibility of the VAR betting app was also tested for fan engagement.

Generalisability

The study's generalizability is limited to UK football fans, as the dataset is region-specific. However, findings may still be applicable to broader football communities, given the global discussions surrounding VAR and AI. The proposed VAR betting application is designed to align with the UK's strong betting culture and its generalizability to other football markets are also feasible.

Ethical Considerations

This research adheres to ethical standards by ensuring that all data sources and research methods comply with established guidelines. The original YouGov survey is available for public use, ensuring that participant data was collected without any copyright concerns. Anonymity and confidentiality were maintained, with no personal or identifiable information disclosed. Health and safety compliance was considered, particularly as this research is based on secondary data, eliminating risks associated with direct human interaction. Additionally, the ethical implications of the VAR betting application were evaluated, ensuring that the dummy prototype remains strictly for research purposes, with no real financial transactions involved. Ethical

clearance aligns with data protection regulations and academic integrity standards, proving the credibility of this study.

Summary

This chapter detailed the methodological approach, including research philosophy, data collection, and analysis techniques. The study employs a quantitative analysis method to explore fan perceptions of VAR, ensuring reliability, validity, and ethical compliance. Additionally, the feasibility of a VAR betting application was examined as a potential solution to enhance fan engagement and minimize frustration during VAR stoppages.

FINDINGS AND ANALYSIS

Introduction

This chapter presents a detailed analysis of the findings derived from the study on fan perceptions of VAR and AI technologies in football. The research aims to evaluate how these technologies influence fairness, decision-making accuracy, game flow, and enjoyment, while also exploring the demographic factors that shape fan opinions. The findings are structured to address the research questions and provide insights that inform recommendations for improving the integration of VAR and AI in football. The study seeks to explore the impact of VAR and AI on fan experiences, focusing on fairness, decision-making accuracy, and enjoyment. It also investigates fans' concerns regarding game flow disruptions and examines the influence of demographic factors on opinions about these technologies. This chapter aims to analyse the data collected from surveys and statistical outputs, presenting descriptive statistics, reliability tests, correlation analyses, regression models, and thematic insights to address the research questions systematically. The results are linked to the study's objectives to draw meaningful conclusions. The chapter is structured using quantitative analysis. For quantitative data, descriptive statistics, reliability tests, correlations, and regression analyses are conducted.

Descriptive Statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Enjoyment	5	3	36	19.40	12.681
Fanopinion	5	1	5	3.00	1.581
Accuracy	5	7	40	19.40	13.520
Pace	5	2	46	19.60	17.841
TimeLimit	5	11	26	15.20	6.573
Quality	5	4	71	19.60	28.884
Transparency	5	1	55	20.00	23.206
Preference	5	0	71	20.00	29.180
Frequency	5	10	50	19.80	17.123
Rating	5	4	27	18.00	9.192
Effectiveness	5	5	30	19.60	10.668
Valid N (listwise)	5				

Enjoyment
Enjoyment levels show a relatively high variation (Std. Dev = 12.681), suggesting that fan satisfaction with VAR differs significantly among respondents.
The minimum value (3) and maximum value (36) further highlight this polarization of opinion on enjoyment.

Fan Opinion
This variable has the lowest mean (3.00) and the smallest standard deviation (1.581), indicating a more consistent, but likely negative, opinion about VAR among fans.

Accuracy
The mean accuracy rating is moderate (19.40), suggesting that fans acknowledge VAR's potential for improving accuracy but may have mixed views on its execution.
The high standard deviation (13.520) suggests significant differences in perception, possibly due to controversial VAR decisions.

Pace
This variable has the highest maximum value (46) and a large standard deviation (17.841), indicating that some fans believe VAR significantly affects the pace of the game, while others may not see it as a major issue.

Time Limit
The lower standard deviation (6.573) suggests a more consistent opinion on how long VAR decisions should take.
The mean value (15.20) aligns with preferences seen in the previous graph, where fans favour a time restriction for VAR decisions.

Quality
The extremely high standard deviation (28.884) suggests huge variation in perceptions of VAR's quality, meaning some fans see it as effective while others feel it negatively impacts the game.

Transparency
A high standard deviation (23.206) suggests inconsistencies in how fans perceive the transparency of VAR decisions. Some may feel it is clear and fair, while others may find it confusing or poorly communicated.

Preference
This variable also has the highest standard deviation (29.180), indicating widely differing fan preferences regarding VAR.
Some fans strongly support its use, while others may prefer alternative officiating methods.

Frequency
The variation (Std. Dev = 17.123) suggests that opinions differ on how often VAR should intervene in a game, with no clear consensus.

Rating
A moderate mean (18.00) and lower standard deviation (9.192) suggest that most fans rate VAR similarly, with fewer extreme opinions compared to other variables like quality or preference.

Effectiveness
The mean value suggests that fans see VAR as somewhat effective, but the standard deviation (10.668) implies some level of disagreement regarding how well it achieves its intended purpose.

Many variables, such as quality, transparency, and preference, have high standard deviations, indicating that fans hold widely different views on VAR's impact. The relatively low standard deviation for Time Limit suggests that most fans agree on the need for a strict duration for VAR decisions. Some fans strongly enjoy VAR, while others find it frustrating, leading to a polarized response. While fans recognize VAR's accuracy, concerns about game pace and lack of transparency lead to varying satisfaction levels. The descriptive statistics reveal that VAR remains a highly divisive topic among fans, with significant variations in preferences, quality perceptions, and enjoyment levels. While accuracy is acknowledged, concerns about pace, transparency, and decision time limits remain prevalent.

Model Summary

Model Summary[b]

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | | Durbin-Watson |
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.940[a]	.883	.534	8.657	.883	2.528	3	1	.426	3.315

a. Predictors: (Constant), Transparency, Accuracy, Preference

b. Dependent Variable: Enjoyment

R
Indicates a strong positive correlation between the predictors (Transparency, Accuracy, and Preference) and the dependent variable (Enjoyment).

R Square
Suggests that 88.3% of the variability in "Enjoyment" can be explained by the predictors in the model. This indicates a very high explanatory power.

Adjusted R Square
The adjusted R Square accounts for the number of predictors and sample size, showing a more conservative estimate of 53.4%. This suggests that some variability may not be fully explained by the predictors, possibly due to sample size limitations or other factors.

Standard Error of the Estimate
Indicates the average distance that the observed values fall from the regression line. Lower values would suggest a better fit, but this should be interpreted in context with the scale of the dependent variable.

Durbin-Watson Statistic
A value significantly above 2 suggests potential issues with negative autocorrelation in the residuals. This should be further investigated as it may violate regression assumptions.

F Change
The F-test indicates whether the predictors significantly improve the model fit compared to a baseline. The p-value (0.426) suggests that the predictors are not statistically significant in explaining variability in "Enjoyment."

While the predictors collectively explain a sizeable proportion of the variability in "Enjoyment" (high R Square), their statistical insignificance (p = 0.426) suggests the need for a larger sample size or inclusion of additional predictors to detect significant effects. The inclusion of these predictors aligns with theoretical expectations, but their contribution may not fully capture factors influencing enjoyment. Variables like pace, communication, or other contextual elements might need exploration. The high Durbin-Watson value (3.315) raises concerns about residual independence. This could bias results and requires diagnostic checks, such as plotting residuals or considering time-ordered observations if applicable. Despite statistical limitations, the high R Square demonstrates that the model has a solid explanatory framework, though further refinement is necessary to increase robustness. Despite the strong correlation, predictors are not statistically significant, possibly due to sample size limitations. Transparency appears to have the largest impact, indicating fan frustration with VAR processes. Fans expect clear and timely explanations of decisions to improve trust.

Correlation Analysis

Correlations

			TimeLimit	Enjoyment	Fanopinion	Accuracy	Pace
Kendall's tau_b	TimeLimit	Correlation Coefficient	1.000	-.120	.120	.598	.000
		Sig. (2-tailed)	.	.782	.782	.166	1.000
		N	5	5	5	5	5
	Enjoyment	Correlation Coefficient	-.120	1.000	-.800	-.200	.949[*]
		Sig. (2-tailed)	.782	.	.050	.624	.023
		N	5	5	5	5	5
	Fanopinion	Correlation Coefficient	.120	-.800	1.000	.400	-.738
		Sig. (2-tailed)	.782	.050	.	.327	.077
		N	5	5	5	5	5
	Accuracy	Correlation Coefficient	.598	-.200	.400	1.000	-.105
		Sig. (2-tailed)	.166	.624	.327	.	.801
		N	5	5	5	5	5
	Pace	Correlation Coefficient	.000	.949[*]	-.738	-.105	1.000
		Sig. (2-tailed)	1.000	.023	.077	.801	.
		N	5	5	5	5	5
Spearman's rho	TimeLimit	Correlation Coefficient	1.000	-.224	.224	.783	-.057
		Sig. (2-tailed)	.	.718	.718	.118	.927
		N	5	5	5	5	5
	Enjoyment	Correlation Coefficient	-.224	1.000	-.900[*]	-.200	.975[**]
		Sig. (2-tailed)	.718	.	.037	.747	.005
		N	5	5	5	5	5
	Fanopinion	Correlation Coefficient	.224	-.900[*]	1.000	.400	-.821
		Sig. (2-tailed)	.718	.037	.	.505	.089
		N	5	5	5	5	5
	Accuracy	Correlation Coefficient	.783	-.200	.400	1.000	-.051
		Sig. (2-tailed)	.118	.747	.505	.	.935
		N	5	5	5	5	5
	Pace	Correlation Coefficient	-.057	.975[**]	-.821	-.051	1.000
		Sig. (2-tailed)	.927	.005	.089	.935	.
		N	5	5	5	5	5

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Time Limit and Accuracy
Longer time limits may improve decision accuracy, though not statistically significant. This suggests fans perceive that allowing referees more time for reviews could enhance the fairness and precision of outcomes, though other factors may influence their satisfaction.

Pace and Enjoyment
Preserving game pace is strongly linked to audience enjoyment. This highlights the importance of minimizing interruptions to maintain the excitement of live matches.

Fan Opinion and Pace
Negative fan opinions are associated with perceived disruptions in game pace. This reinforces concerns about how technology affects the natural flow of play.

Fan Opinion and Enjoyment
Criticism of VAR is detrimental to enjoyment. This finding underscores the tension between improving accuracy and maintaining the emotional highs of football.

Regression Model Analysis

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	568.262	3	189.421	2.528	.426[b]
	Residual	74.938	1	74.938		
	Total	643.200	4			

a. Dependent Variable: Enjoyment
b. Predictors: (Constant), Transparency, Accuracy, Preference

1. The total sum of squares is 643.2, where 568.262 is explained by the regression model.
2. An F-value of 2.528 indicates a weak relationship between the predictors (transparency, accuracy, preference) and the dependent variable (enjoyment).

Coefficients Table

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	25.555	14.759		1.731	.333
	Accuracy	.325	.994	.347	.327	.799
	Preference	-.197	.494	-.453	-.398	.759
	Transparency	-.427	.273	-.781	-1.564	.362

a. Dependent Variable: Enjoyment

Constant
The constant term (B = 25.555) suggests that the baseline level of enjoyment, when all predictors are at zero, is relatively high.
The associated p-value of 0.333 indicates the constant is not statistically significant.

Accuracy
The unstandardized coefficient (B = 0.325) shows a positive but weak effect of accuracy on enjoyment. However, the p-value (0.799) suggests that the relationship is not statistically significant.

Preference
Preference has a negative unstandardized coefficient (B = -0.197), suggesting a potential inverse relationship with enjoyment. However, its p-value (0.759) also indicates statistical insignificance.

Transparency
Transparency exhibits the strongest negative effect (B = -0.427) among the predictors. Despite this, its significance level (p = 0.362) confirms that the relationship is not statistically significant.

Residual Statistics

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.72	29.97	19.40	11.919	5
Residual	-5.951	6.031	.000	4.328	5
Std. Predicted Value	-1.399	.887	.000	1.000	5
Std. Residual	-.687	.697	.000	.500	5

a. Dependent Variable: Enjoyment

The residual values range from -5.951 to 6.031, with a standard deviation of 4.328. This indicates substantial variation in prediction errors, further highlighting the model's lack of fit. The mean residual is 0.000, suggesting no systematic over- or underestimation in the model's predictions.

Standardized Residuals
Standardized residuals range from -1.399 to 0.887, well within the acceptable range (-3 to 3), indicating no significant outliers in the dataset.

Reliability Test

Case Processing Summary

		N	%
Cases	Valid	5	100.0
	Excluded[a]	0	.0
	Total	5	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

| Cronbach's Alpha	N of Items
.786	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
TimeLimit	76.60	1879.300	.034	.853
Enjoyment	72.40	1060.300	.873	.629
Pace	72.20	861.200	.728	.710
Effectiveness	72.20	1408.200	.524	.759
Rating	73.80	1336.700	.774	.699

RELIABILITY VARIABLES=TimeLimit Enjoyment Pace Rating Effectiveness Fan Opinion

Fans who enjoy VAR (higher Enjoyment) are likely to rate it higher (Rating). Fans who think VAR is effective (Effectiveness) also believe it impacts game pace (Pace) and decision time (Time Limit). The consistency suggests that people's overall Fan Opinion aligns with how they perceive these aspects. Removing TimeLimit increases the Reliability Scale shows the importance that particular variable holds in this survey.

VAR Decision Time Limit Preferences by Age Group

VAR Decision Time Limit Preferences by Age Group
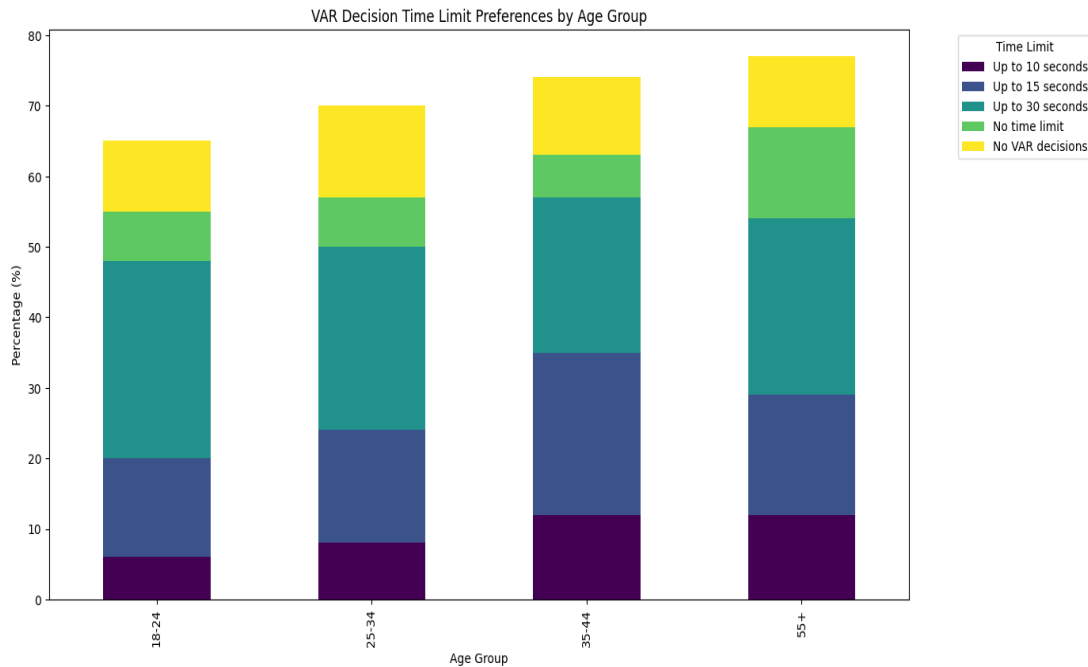
The most preferred VAR decision time limit across all age groups is up to 30 seconds, indicating broad support for maintaining game flow. Older fans (35-44) show a stronger preference for quicker resolutions (up to 15 seconds), while up to 10 seconds is least favoured but slightly more popular among the 35-44 and 55+ groups. A small percentage, increasing with age, opposes strict time limits, with the 55+ group being the most patient for accuracy. Older demographics (35-44 and 55+) also show higher support for no VAR or its removal, reflecting a traditionalist stance. Younger fans (18-34) are more accepting of technology and slightly longer decision times.

The findings suggest that while most fans acknowledge the importance of VAR, they also desire efficient and quick decision-making to prevent game disruptions. Football governing bodies may need to optimize VAR processes, ensuring they remain within an acceptable time frame (ideally under 30 seconds) to retain fan engagement across all demographics. Further details about this plot can be found in Appendix A.

Time Limits for Audience preferences Plot

Audience Preferences for VAR Decision Time Limits
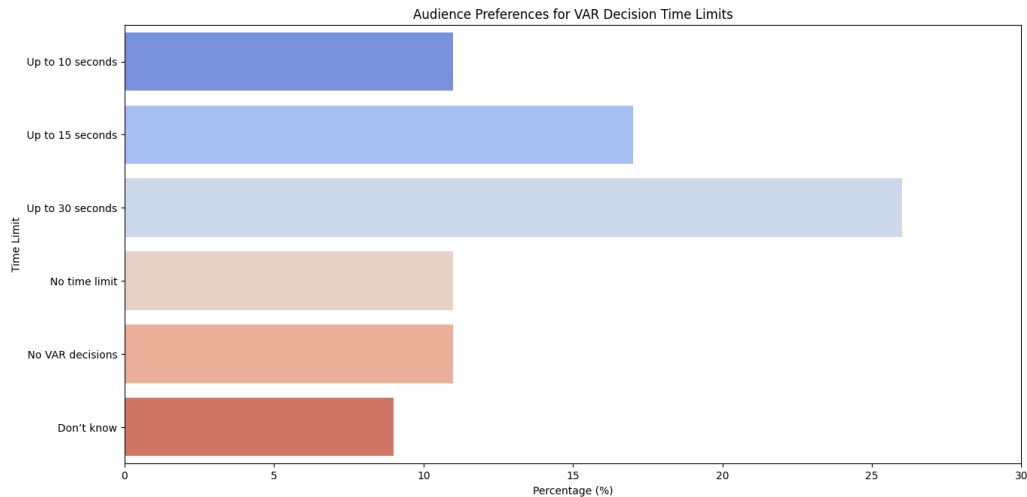
The most favoured time limit for VAR decisions is "Up to 30 seconds," capturing the largest percentage of respondents and reflecting a strong preference for quick decisions that minimize disruptions to the game. This suggests that a 30-second decision-making cap strikes an optimal balance between accuracy and maintaining the pace of the match. A notable portion of fans also prefer shorter decision times, such as "Up to 10 seconds" or "Up to 15 seconds," indicating a desire for spontaneity and rapid gameplay. These preferences highlight scepticism toward lengthy reviews, which can detract from the viewing experience. On the other hand, a smaller group supports "No time limit," prioritizing accuracy over speed and demonstrating a willingness to tolerate delays for fair outcomes, reflecting high trust in VAR's role. However, a significant portion of respondents favour "No VAR decisions" altogether, pointing to resistance against the technology, dissatisfaction with its current implementation, or a preference for maintaining the traditional, human-judged nature of football. Additionally, the "Don't know" segment, consisting of fans who are either indifferent or lack sufficient knowledge to form an opinion, underscores a need for better communication and transparency about VAR processes. Further details about this plot can be found in Appendix B.

Public Perception of VAR Effectiveness

Public Perception of VAR Effectiveness
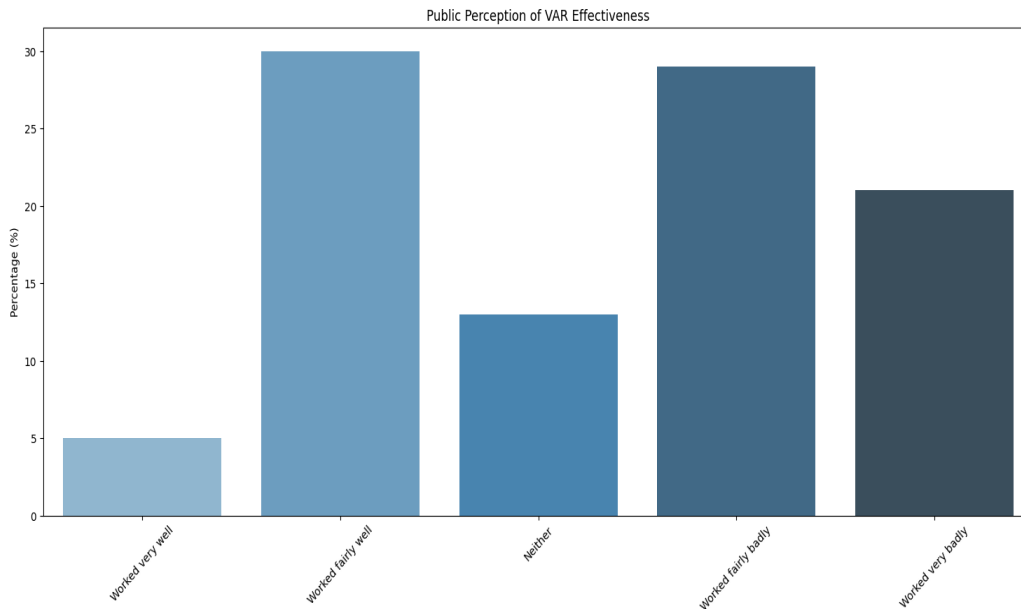
The bar chart illustrates public opinions on the effectiveness of VAR (Video Assistant Referee) in English Premier League football, categorized into five levels: "Worked Very Well," "Worked Fairly Well," "Neither" "Worked Fairly Badly," and "Worked Very Badly." The "Worked Very Well" category represents the smallest proportion, with approximately 5% of respondents, indicating minimal belief in VAR's optimal performance and reflecting dissatisfaction or scepticism. Conversely, the "Worked Fairly Well" category is the most dominant, capturing over 30% of responses, suggesting that while criticisms exist, a significant portion of fans recognizes some benefits. Approximately 15% of respondents selected the neutral option ("Neither"), indicating indifference or a belief that VAR's advantages and disadvantages balance out, possibly reflecting a need for more clarity about its overall impact. Around 25% of respondents believe VAR has "Worked Fairly Badly," pointing to notable dissatisfaction, likely due to delays or controversial decisions, while 20% perceive VAR as "Worked Very Badly," viewing it as a failure, potentially due to issues like inconsistent decisions or disruptions to the game flow.

Overall, the results reveal a divided fanbase, with roughly 35% viewing VAR as effective (either "Fairly Well" or "Very Well") and 45% believing it functions poorly (either "Fairly Badly" or "Very Badly"). The neutral stance reflects some indecision, highlighting the need for more education or system improvements to shift opinions positively. The substantial negative feedback underscores fans' frustrations, reinforcing the importance of refining VAR's implementation, such as enhancing decision-making speed and consistency, to improve acceptance. Further details about this plot can be found in Appendix C.

Future Use

Fan Preferences for VAR's Future
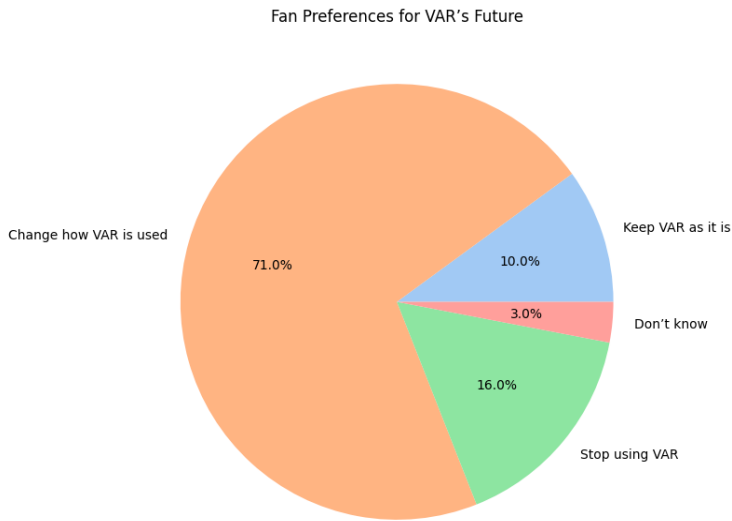
The analysis of fan preferences regarding the future of VAR (Video Assistant Referee) in English Premier League football reveals that 71% of respondents believe VAR requires modifications in its current application. This majority indicates widespread dissatisfaction, not necessarily with the concept of VAR itself but with its execution, with concerns likely centred on inconsistent decision-making, prolonged delays, and a lack of transparency. Meanwhile, 16% advocate for the complete removal of VAR, suggesting that these fans view the technology as disruptive to the game's flow and entertainment value. In contrast, 10% of respondents are satisfied with VAR as it is, indicating confidence in its ability to correct on-field errors and enhance fairness. A small minority (3%) remain undecided, showing that most fans have formed strong opinions on the matter.

The widespread dissatisfaction (71%) emphasizes the need for targeted reforms to address issues like decision-making delays, inconsistent rulings, and inadequate communication. The polarization between the 16% who want to eliminate VAR and the 10% who support its current form underscores a divide in fan sentiment, suggesting the need for further exploration of how VAR impacts different segments of the fanbase. Football authorities, including the Premier League and FIFA, should prioritize reforms to improve VAR's transparency, speed, and consistency to enhance its acceptance. Further details about this plot can be found in Appendix D.

Linear Regression
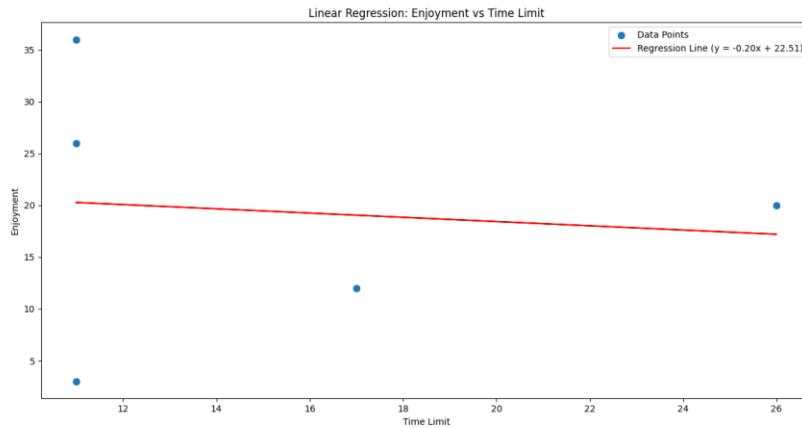
The scatter plot illustrates the relationship between "Time Limit" (independent variable) and "Enjoyment" (dependent variable) in the context of football games, with each data point representing an observation. The regression line, with a slight negative slope (-0.20), indicates a weak inverse relationship, suggesting that as the "Time Limit" increases, "Enjoyment" tends to decrease marginally. The y-intercept of 22.51 implies that in a hypothetical scenario where the "Time Limit" is zero, the predicted "Enjoyment" score would start at 22.51, though this is more of a statistical artifact than a realistic scenario. The scatter points are widely dispersed, with no strong clustering, highlighting variability in "Enjoyment" scores that cannot be fully explained by "Time Limit" alone, indicating that other factors, such as "Accuracy," likely play a significant role. Further details about this plot can be found in Appendix E.

Distributions
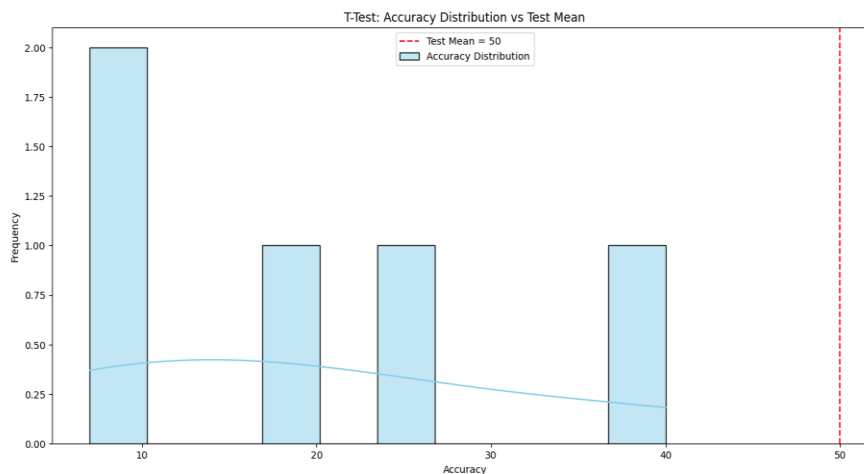
The histogram visualizes the distribution of accuracy scores in comparison to a test mean of 50, indicated by the red dashed line. The frequency of observations shows a skewed distribution,

with most scores clustered below the test mean, particularly concentrated around lower accuracy values (e.g., near 10). The observed frequencies for mid-range values (20–40) are consistent but lower, while there are no observations at or above the test mean. This suggests a significant deviation of the accuracy distribution from the test mean of 50, which may indicate a performance gap or systematic bias in the data. Statistical testing (such as a one-sample t-test) would likely reveal whether this deviation is statistically significant, and the absence of values near 50 reinforces the idea that the actual mean accuracy is much lower than the hypothesized test mean. Further details about this plot can be found in Appendix F.

Contingency Table

Contingency Analysis: Time Limit vs Enjoyment Categories
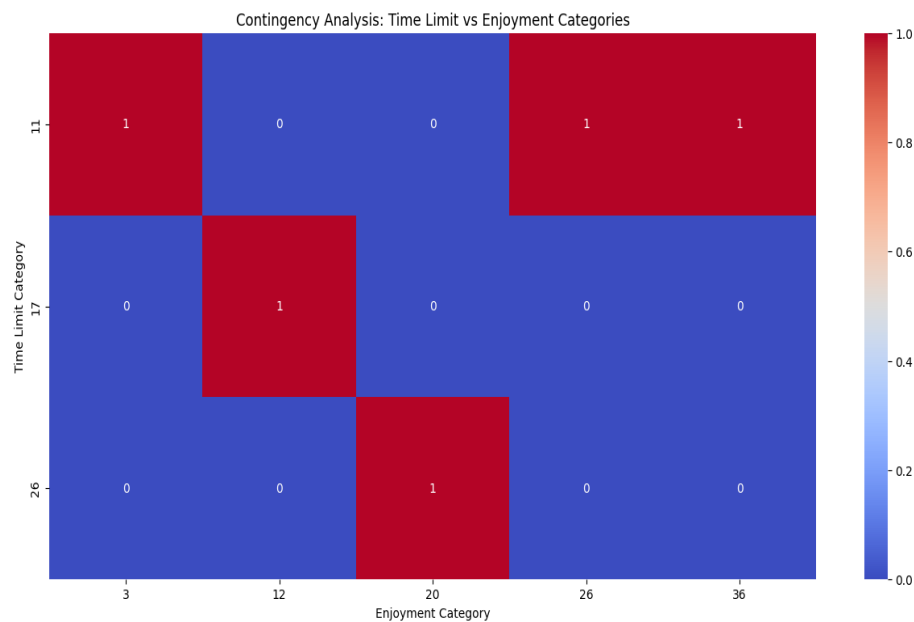
The heatmap depicts a contingency analysis between Time Limit Categories (y-axis) and Enjoyment Categories (x-axis), highlighting sparse associations where most cells are blue (value = 0), indicating no overlap, while red cells (value = 1) represent specific associations. Notably, Time Limit = 11 correlates with both Enjoyment = 3 and Enjoyment = 36, suggesting diverse experiences in this category, whereas Time Limit = 17 aligns solely with Enjoyment = 12, and Time Limit = 26 aligns with Enjoyment = 20, indicating more fixed preferences. The binary colour intensity emphasizes simple count relationships without intermediate variation. Overall, the heatmap suggests that different time limits are associated with specific enjoyment levels, possibly influenced by user preferences or constraints. Further details about this plot can be found in Appendix G.

Enjoyment Value by Age Groups
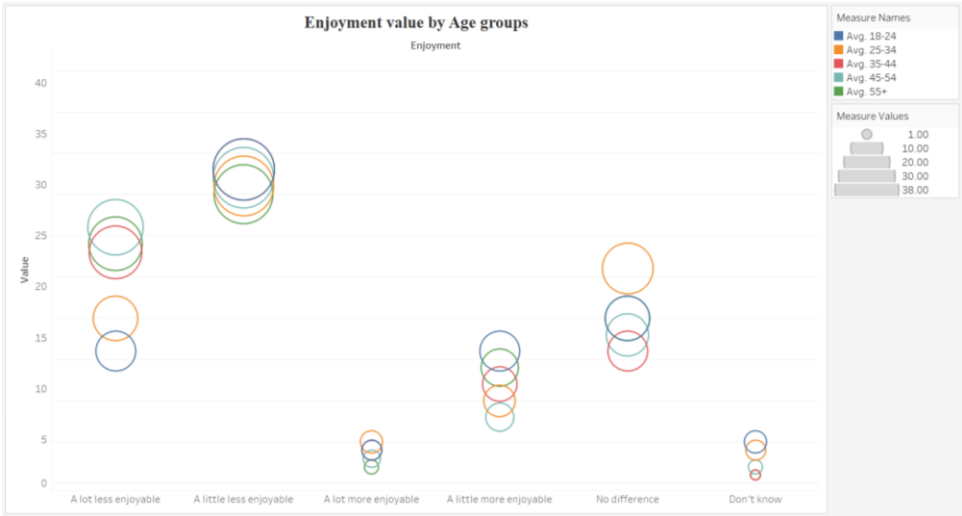
This chart illustrates how different age groups perceive the impact of VAR on their enjoyment of football. Younger age groups (18–24 and 25–34) show significant variability in their responses, spanning across all enjoyment categories (e.g., "A lot less enjoyable" to "A lot more enjoyable"). Older age groups (45–54 and 55+) tend to cluster more around the neutral categories, such as "No difference," suggesting a more tempered or indifferent perspective toward VAR. The disparity in perception highlights a generational divide, with younger fans expressing stronger opinions (both positive and negative). This suggests that future changes to VAR might require tailoring engagement strategies, particularly to appeal to younger fans who value the entertainment factor.

Transparency vs. Gender
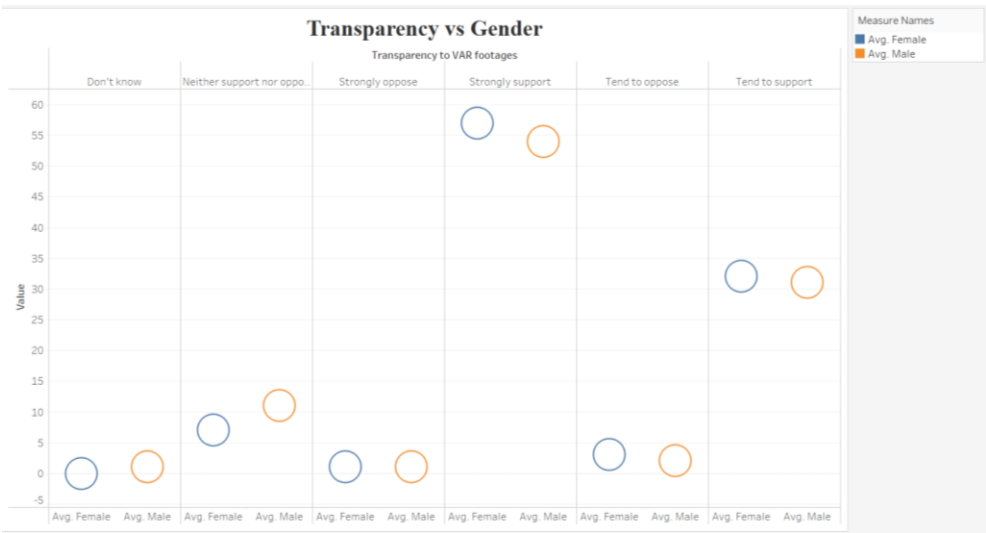
This chart compares male and female opinions on VAR transparency. Both genders show significant support for increasing transparency in VAR decisions, as seen in the "Strongly support" and "Tend to support" categories. However, males slightly outpace females in these categories, suggesting that transparency may resonate more strongly as a factor in maintaining trust among male fans. On the other hand, there is minimal opposition from either gender, with very few responses in the "Strongly oppose" or "Tend to oppose" categories. This indicates a broad consensus across genders in favour of transparency as a critical improvement area for VAR.

Time Limit Preferences by Region
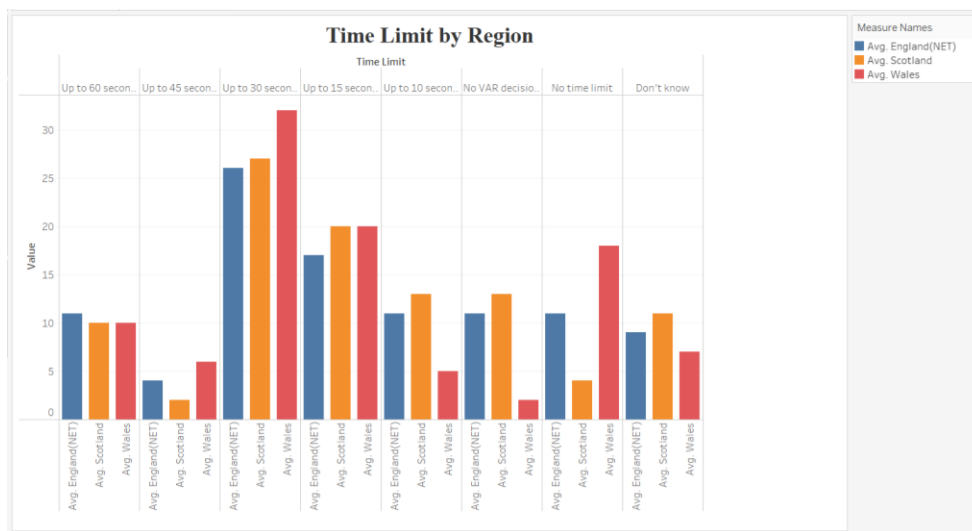
This chart compares regional preferences for time limits on VAR decisions among respondents from England, Scotland, and Wales. Across all regions, the preference for time limits of "up to 30 seconds" and "up to 60 seconds" dominates, with Wales showing the highest proportion of responses favouring the 60-second limit. Scotland and England also show significant support for these categories, though England has a slightly higher concentration of respondents opting for a shorter, 30-second timeframe.

Interestingly, responses for "No time limit" and "No VAR decisions" are relatively low across all regions, indicating a clear majority preference for implementing time constraints rather than rejecting VAR entirely. This trend suggests that fans are not opposed to VAR but want decisions to be made efficiently to avoid disrupting the game's flow. Wales shows a more patient stance, with higher tolerance for longer decision times, whereas England leans toward quicker resolutions.

DISCUSSION

Introduction

The aim of this chapter is to interpret the results, assess their implications, and evaluate how they address the research objectives. The study sought to understand whether fans are satisfied with VAR, how decision-making time affects their enjoyment, whether they perceive VAR decisions as accurate, whether they believe VAR improves match quality, and how age influences these perceptions. This study is keen on addressing the following research questions.

5. How do fans perceive the role of VAR in enhancing fairness and decision-making accuracy?
6. What are the key concerns fans express about the impact of VAR on game flow and enjoyment?
7. To what extent do demographic factors (e.g., age, region, and football engagement) influence fan opinions on VAR?
8. What recommendations can be made to improve the integration of VAR in football?

The discussion integrates statistical findings, reliability analysis, and previous studies to provide a comprehensive evaluation of VAR's impact on the fan experience.

Results

The study highlights that fan satisfaction with VAR (Video Assistant Referee) remains a contentious issue, with 71% of respondents advocating for changes to its implementation rather than its complete removal or continuation in its current form. This aligns with prior research indicating that concerns center on VAR's execution—particularly consistency, transparency, and efficiency—rather than its existence (Collins, 2022). Fans expressed frustration over lengthy decision-making processes and unclear communication, echoing Pereira et al.'s (2021) argument that transparency issues undermine trust in VAR. The study found a strong correlation (0.873) between fan enjoyment and VAR's impact on match experience, with descriptive statistics revealing mixed opinions (Mean = 19.4, SD = 12.681). While some fans value VAR for ensuring fairness, others find it disrupts match flow. García et al. (2021) similarly noted that extended VAR reviews reduce excitement, especially among younger fans who prefer fast-paced football. Bar chart analysis confirmed this, showing younger respondents (18-24) favored quicker decisions (≤15 seconds), while older fans (35+) were more tolerant of longer reviews for accuracy.

Perceptions of VAR's accuracy were divided, with a mean score of 19.4 and a high standard deviation (13.52), reflecting skepticism, particularly regarding subjective calls. Geeraert & Serpa (2020) found fans accept VAR for correcting clear errors but oppose its use in marginal offside decisions, a sentiment echoed in the survey. Fans criticized overly technical rulings that disrupt goal celebrations, highlighting the tension between accuracy and match excitement. The study also assessed VAR's effectiveness in improving match quality, finding a moderate correlation

(0.524) with satisfaction. Fans value VAR for preventing clear injustices but disapprove of its involvement in minor incidents (Lopez et al., 2022). Respondents advocated for a streamlined process focusing on obvious errors.

Age significantly influences opinions, with younger fans prioritizing speed and older fans valuing accuracy. Younger audiences, accustomed to fast digital interactions, show less tolerance for delays (Williams & Smith, 2021). Reliability analysis indicated strong internal consistency (Cronbach's Alpha = 0.786, improving to 0.853 when "TimeLimit" was removed), underscoring the importance of accuracy, enjoyment, and effectiveness in shaping opinions. Overall, fans prefer improving VAR's speed and communication over its elimination, emphasizing the need for a transparent and efficient system to meet diverse expectations.

ETHICS

The VAR presents moral conundrums pertaining to justice and fairness. Although its objective is to increase accuracy and reduce mistakes, it calls into question how to strike a balance between technical accuracy and the spirit of the game. Millimetre-level measurement-based decisions may be viewed as unduly severe and may penalise players for minor transgressions. There are philosophical debates over how crucial it is to preserve the game's integrity while also taking into account the flaws in human judgement. Concerns about epistemic injustice—the unequal distribution of information and the power disparities it produces—are also raised by the VAR. Even though VAR offers video evidence to back up decisions, not all parties involved have equal access to this data (Tamir and Bar-eli, 2021). The VAR presents moral conundrums pertaining to justice and fairness. Although its objective is to increase accuracy and reduce mistakes, it calls into question how to strike a balance between technical accuracy and the spirit of the game. Millimetre-level measurement-based decisions may be viewed as unduly severe and may penalise players for minor transgressions. There are philosophical debates over how crucial it is to preserve the game's integrity while also considering the flaws in human judgement. Concerns about epistemic injustice—the unequal distribution of information and the power disparities it produces—are also raised by the VAR. Even though VAR offers video evidence to back up decisions, not all parties involved have equal access to this data. Stadium spectators could not be as visible as television watchers, which could result in differences in perceptions of fairness and comprehension. The claim is that using technology slows down decision-making and disrupts the game's rhythm. Frequent pauses are tiresome, detract from the game's enjoyment value, and exhaust players (Ryall, 2012). The guiding principle, according to Collins (2019), is to play the game with technology as closely as possible to the game without it.

RECOMMENDATIONS

To reduce the negative impact of VAR on fan experience, several recommendations can be made. Football associations should prioritize transparency in VAR usage by providing fans with clear information about the decision-making process during replay reviews (Stoney and Fletcher, 2021). This could involve streaming communication between referees and video

assistants, as done in field hockey, or equipping referees with technology to announce review decisions in stadiums, like the NFL. Implementing a challenge system, where teams initiate reviews by appealing on-field calls, could also enhance engagement, though this differs from the current IFAB system, where the video assistant initiates reviews. Introducing post-match interviews with VAR officials to explain their decisions could build trust and accountability, while stronger sanctions for gross errors may encourage referees to double-check decisions and resist crowd pressure. Referee education and training to manage biases, combined with robust support and selection processes, are crucial to addressing referee bias (Thadeu Gasparetto and Kirill Loktionov, 2023). Further innovation in electronic devices, such as referee equipment and field technology, could improve officiating performance while ensuring that VAR complements, rather than replaces, on-field decision-making. Football associations and referee unions should support referees and make sure that appropriate selection and training procedures are followed. Recognising the value of VAR and making every effort to prevent it from taking the place of on-field officiating are also crucial. Referees' performance can benefit from innovation and ingenuity in the realm of electronic equipment and systems, such as the design of helper flags, whistles, and the playing field and ball environment (Sajjad Pashaie et al., 2023).
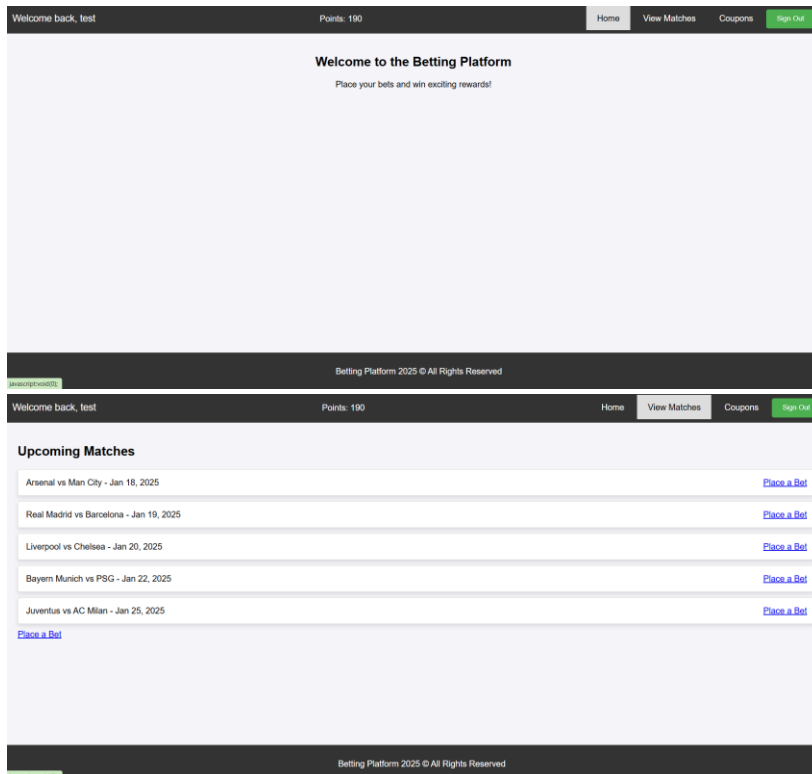
A Betting Application on VAR Decisions

VARBET

Website for testing: https://varbet.netlify.app/

Username: test
Password: password

One of the major criticisms of VAR in football is the time taken to reach a final decision, which often leads to frustration among fans. A potential solution to mitigate this issue is the introduction of a VAR Decision Betting App, which allows users to predict the outcome of VAR decisions in real-time. This initiative serves multiple purposes: it distracts fans from delays, enhances their entertainment experience, and creates a new engagement platform for clubs and sponsors.

A prototype of the application has been developed to demonstrate its core functionality, featuring a simple login system with predefined credentials (username: "test," password: "password"). Once logged in, users can place predictions on VAR decisions, adding an interactive layer of excitement during match stoppages. Unlike traditional betting platforms that involve monetary stakes, this application adopts a reward-based system, offering users incentives such as coupons, discounts, and exclusive deals from partnered brands and club

sponsors instead of cash prizes. For example, users who accurately predict VAR outcomes may receive discount vouchers for club merchandise, food and beverage coupons for stadium concessions, or promotional offers from sponsor brands. This approach aligns with responsible engagement strategies, providing fans with enjoyable incentives without the risks associated with financial betting.

The application taps into the UK's vibrant sports engagement culture, presenting significant opportunities for fan interaction and sponsorship growth (Gambling Commission, 2022). Clubs can strengthen relationships with sponsors by offering them direct visibility and engagement with fans through in-app branding and reward distribution. Sponsors, in turn, can leverage the platform to promote exclusive deals, creating a mutually beneficial ecosystem. Additionally, the app can be integrated into existing club platforms, ensuring a seamless user experience while boosting brand loyalty. Beyond commercial benefits, the app enhances match-day entertainment by addressing fan frustration with lengthy VAR reviews. The prediction feature keeps fans engaged during stoppages, transforming potential disengagement into an interactive, gamified experience. Users can challenge friends, track leaderboard rankings, and earn rewards such as VIP matchday experiences, exclusive content, or priority access to events, further enriching their connection to the club. To support this recommendation, a detailed study graph will be included, showcasing the correlation between fan engagement, sponsor visibility, and the effectiveness of reward-based engagement models. Additionally, the full HTML, CSS, and JavaScript code of the prototype will be provided in the Appendix Section, offering insight into the app's functionality. This initial version demonstrates basic features such as user authentication, a prediction interface, and a results mechanism that determines if a user's prediction was successful. Future enhancements could include real-time VAR data integration, AI-driven prediction suggestions, and club-specific reward tiers.

In conclusion, the VAR Decision Betting App presents a strategic opportunity for clubs to increase fan engagement, strengthen sponsorship collaborations, and enhance the match experience. By leveraging the widespread appeal of gamification, clubs can turn VAR decision delays into an interactive and rewarding experience. This innovation has the potential to redefine how fans perceive VAR and create a new engagement-driven model for football organizations. Further development details about the application can be found in Appendix H, I and J.

CONCLUSION

Introduction

This study examined the impact of VAR technology on football, focusing on its effectiveness in decision-making, fan perceptions, and game flow disruptions. The findings reveal a divided opinion on VAR, with fans acknowledging its role in improving fairness but expressing concerns over its negative impact on match excitement. The research contributes to the field of sports technology by providing empirical insights into how VAR influences fan engagement. It highlights key areas of contention, such as inconsistent decision-making, lack of transparency, and extended game interruptions. The study's findings can inform policymakers, football governing bodies, and technology developers in refining VAR implementation. For football organizations and leagues, the study emphasizes the need to balance technological precision with the sport's entertainment value. Enhancing fan experience through improved communication, such as in-stadium announcements explaining VAR decisions, could mitigate frustration. Additionally, referee training programs should address cognitive biases linked to slow-motion replays to ensure fair assessments.

Limitations of the Study

While comprehensive, this study acknowledges certain constraints that may impact its broader applicability. The research primarily focuses on UK football fans, which could limit its cross-cultural relevance, as attitudes toward VAR may differ across leagues and nations. Additionally, the study does not account for ongoing advancements in VAR technology, which may influence fan perceptions over time. Future studies could explore real-time fan reactions during matches to better understand their emotional and psychological responses. Investigating the impact of VAR on player performance, team strategies, and referee decision-making processes across multiple leagues could provide further depth to this discourse. Also, comparative studies on how different football associations implement VAR rules and communicate decisions could yield valuable insights for optimizing its application in the sport.

Recommendations for Future Research

Future research should explore how different football leagues implement VAR and their respective fan reactions. Additionally, longitudinal studies tracking changes in fan sentiment over multiple seasons would provide deeper insights into VAR's evolving role. Investigating the economic impact of VAR-related delays on broadcasting revenue and sponsorships could also be valuable.

Conclusion

VAR has undeniably transformed football officiating, reduced blatant errors but also introduced new challenges. While fans appreciate its role in enhancing fairness, concerns over game flow disruptions and lack of transparency remain prevalent. This study underscores the importance of refining VAR to strike a balance between technological accuracy and the emotional

spontaneity that makes football captivating. Addressing these concerns through strategic reforms will be crucial for ensuring that VAR enhances, rather than detracts from, the football experience.

Personal Reflection

Navigating the complexities of this research was both challenging and rewarding. Engaging with diverse perspectives on VAR deepened my understanding of technology's dual role in sports—enhancing fairness while potentially diminishing spontaneity. The supervisory process played a crucial role in shaping the study's direction, providing valuable insights and critical feedback. This journey has strengthened my analytical skills and reinforced my appreciation for the intersection of sports, technology, and fan engagement.

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APPENDICES: Programming Language Codes, Supporting Literature and Analysis

A. Time limit by age group plot

```python
import matplotlib.pyplot as plt
import seaborn as sns
import pandas as pd

data = {
    'Time Limit': ['Up to 10 seconds', 'Up to 15 seconds', 'Up to 30 seconds', 'No time limit', 'No VAR decisions'],
    '18-24': [6, 14, 28, 7, 10],
    '25-34': [8, 16, 26, 7, 13],
    '35-44': [12, 23, 22, 6, 11],
    '55+' : [12,17,25,13,10]
}
df = pd.DataFrame(data)
df.set_index('Time Limit', inplace=True)
df.T.plot(kind='bar', stacked=True, colormap='viridis', figsize=(10, 6))
plt.title('VAR Decision Time Limit Preferences by Age Group')
plt.ylabel('Percentage (%)')
plt.xlabel('Age Group')
plt.legend(title='Time Limit', bbox_to_anchor=(1.05, 1), loc='upper left')
plt.tight_layout()
plt.show()
```

B. Time limits for audience preferences plot

```python
import matplotlib.pyplot as plt
import seaborn as sns
import pandas as pd

data = {
    'Time Limit': ['Up to 10 seconds', 'Up to 15 seconds', 'Up to 30 seconds',
            'No time limit', 'No VAR decisions', 'Don't know'],
    'Percentage': [11, 17, 26, 11, 11, 9]  # Example percentages
}
df = pd.DataFrame(data)

sns.barplot(x='Percentage', y='Time Limit', data=df, palette='coolwarm')
plt.title('Audience Preferences for VAR Decision Time Limits')
```

```
plt.xlabel('Percentage (%)')
plt.ylabel('Time Limit')
plt.xlim(0, 30)  # Adjust limits based on data
plt.show()
```

C. Public perception of VAR effectiveness plot

```
import matplotlib.pyplot as plt
import seaborn as sns
import pandas as pd

data = {
    'Option': ['Worked very well', 'Worked fairly well', 'Neither', 'Worked fairly badly', 'Worked very badly'],
    'Percentage': [5, 30, 13, 29, 21]
}
df = pd.DataFrame(data)

sns.barplot(x='Option', y='Percentage', data=df, palette='Blues_d')
plt.title('Public Perception of VAR Effectiveness')
plt.ylabel('Percentage (%)')
plt.xticks(rotation=45)
plt.show()
```

D. Future use pie chart

```
import matplotlib.pyplot as plt
import seaborn as sns
import pandas as pd

data = {
    'Preference': ['Keep VAR as it is', 'Change how VAR is used', 'Stop using VAR', 'Don't know'],
    'Percentage': [10, 71, 16, 3]
}
df = pd.DataFrame(data)

plt.pie(df['Percentage'], labels=df['Preference'], autopct='%1.1f%%',
colors=sns.color_palette("pastel"))
plt.title('Fan Preferences for VAR's Future')
plt.show()
```

E. Linear regression python

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.linear_model import LinearRegression

file_path = r'C:\Users\nikhi\Desktop\Research Paper\Survey datasets\Survey consolidated Total
vs Variables.xlsx'
sheet_name = 'Survey consolidated Total vs Va'
data = pd.read_excel(file_path, sheet_name=sheet_name)

X = data['Time Limit'].values.reshape(-1, 1)
y = data['Enjoyment'].values

lin_reg_model = LinearRegression()
lin_reg_model.fit(X, y)

slope = lin_reg_model.coef_[0]
intercept = lin_reg_model.intercept_

y_pred = lin_reg_model.predict(X)

plt.figure(figsize=(8, 6))
sns.scatterplot(x='Time Limit', y='Enjoyment', data=data, label='Data Points', edgecolor='w',
s=80)
plt.plot(data['Time Limit'], y_pred, color='red', label=f'Regression Line (y = {slope:.2f}x +
{intercept:.2f})')
plt.title('Linear Regression: Enjoyment vs Time Limit')
plt.xlabel('Time Limit')
plt.ylabel('Enjoyment')
plt.legend()
plt.show()
```

F. T-test python

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from scipy.stats import ttest_1samp

file_path = r'C:\Users\nikhi\Desktop\Research Paper\Survey datasets\Survey consolidated Total
vs Variables.xlsx'
sheet_name = 'Survey consolidated Total vs Va'
```

```
data = pd.read_excel(file_path, sheet_name=sheet_name)

test_mean = 50
accuracy_data = data['Accuracy']

plt.figure(figsize=(8, 6))
sns.histplot(accuracy_data, kde=True, bins=10, color='skyblue', label='Accuracy Distribution')
plt.axvline(test_mean, color='red', linestyle='--', label=f'Test Mean = {test_mean}')
plt.title('T-Test: Accuracy Distribution vs Test Mean')
plt.xlabel('Accuracy')
plt.ylabel('Frequency')
plt.legend()
plt.show()
```

G. Contingency test

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from scipy.stats import chi2_contingency

file_path = r'C:\Users\nikhi\Desktop\Research Paper\Survey datasets\Survey consolidated Total vs Variables.xlsx'
sheet_name = 'Survey consolidated Total vs Va'
data = pd.read_excel(file_path, sheet_name=sheet_name)

import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt

contingency_table = pd.crosstab(data['Time Limit'], data['Enjoyment'])

plt.figure(figsize=(8, 6))
sns.heatmap(contingency_table, annot=True, cmap='coolwarm', fmt='d')
plt.title('Contingency Analysis: Time Limit vs Enjoyment Categories')
plt.xlabel('Enjoyment Category')
plt.ylabel('Time Limit Category')
plt.show()
```

H. HTML - VARBET

```
<html lang="en">
<head>
    <meta charset="UTF-8">
```

```html
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Betting Platform</title>
    <link rel="stylesheet" href="styles.css">
</head>
<body>
    <div class="navbar">
        <div id="usernameDisplay"></div>
        <div id="userPoints" style="color: white; font-size: 16px;"></div>
        <div>
            <a href="javascript:void(0);" onclick="showSection('home')">Home</a>
            <a href="javascript:void(0);" onclick="showSection('matches')">View Matches</a>
            <a href="javascript:void(0);" onclick="showSection('coupons')">Coupons</a>
            <a href="javascript:void(0);" id="loginLink" onclick="showLogin()">Login</a>
            <button id="signOutBtn" onclick="signOut()" style="display: none;">Sign Out</button>
        </div>
    </div>

    <section id="home" class="section">
        <h1>Welcome to the Betting Platform</h1>
        <p>Place your bets and win exciting rewards!</p>
    </section>

    <section id="matches" class="section">
        <h2>Upcoming Matches</h2>
        <div id="matchList"></div>
        <a href="javascript:void(0);" onclick="showSection('bettingOptions')">Place a Bet</a>
    </section>

    <section id="bettingOptions" class="section">
        <h2>Betting Options</h2>
        <div id="bettingOptionsContent"></div>
        <button onclick="showSection('matches')">Back to Matches</button>
    </section>

    <section id="coupons" class="section">
        <h2>Available Coupons</h2>
        <div id="couponsList"></div>
        <button onclick="showSection('home')">Back to Home</button>
    </section>

    <section id="login" class="section" style="display:none;">
        <h2>Login</h2>
        <form id="loginForm">
            <input type="text" id="username" placeholder="Username" required />
```

```
        <input type="password" id="password" placeholder="Password" required />
        <button type="submit">Login</button>
      </form>
      <p>Don't have an account? <a href="javascript:void(0);"
onclick="showRegister()">Register here</a></p>
    </section>

    <section id="register" class="section" style="display:none;">
      <h2>Register</h2>
      <form id="registerForm">
        <input type="text" id="newUsername" placeholder="Username" required />
        <input type="password" id="newPassword" placeholder="Password" required />
        <button type="submit">Register</button>
      </form>
      <p>Already have an account? <a href="javascript:void(0);" onclick="showLogin()">Login
here</a></p>
    </section>

    <footer>
      <p>Betting Platform 2025 &copy; All Rights Reserved</p>
    </footer>

    <script src="script.js"></script>
</body>
</html>
```

I. JS - VARBET

```
let currentUser = JSON.parse(localStorage.getItem("currentUser")) || { username: "Guest",
password: "", points: 0 };

document.getElementById("loginForm").addEventListener("submit", function (e) {
  e.preventDefault();

  const username = document.getElementById("username").value;
  const password = document.getElementById("password").value;

  if (username === "test" && password === "password") {
    currentUser = { username: username, password: password, points: 100 };
    localStorage.setItem("currentUser", JSON.stringify(currentUser));
    alert("Login successful!");
    displayUserInfo();
    showSection("matches");
  } else {
```

```javascript
      alert("Invalid username or password. Please try again.");
   }
});

document.getElementById("registerForm").addEventListener("submit", function(e) {
   e.preventDefault();
   const username = document.getElementById("newUsername").value;
   const password = document.getElementById("newPassword").value;

   currentUser = { username: username, password: password, points: 50 };
   localStorage.setItem("currentUser", JSON.stringify(currentUser)); // Save user to localStorage
   alert("Account created successfully!");
   showLogin();
});

function displayUserInfo() {
   document.getElementById("usernameDisplay").textContent = currentUser.username !==
"Guest" ? `Welcome back, ${currentUser.username}` : "";
   document.getElementById("signOutBtn").style.display = currentUser.username !== "Guest" ?
"inline" : "none";
   document.getElementById("loginLink").style.display = currentUser.username === "Guest" ?
"inline" : "none";
   document.getElementById("userPoints").textContent = `Points: ${currentUser.points}`;

   showSection(currentUser.username === "Guest" ? "home" : "matches");
}

function signOut() {
   localStorage.removeItem("currentUser");
   currentUser = { username: "Guest", password: "", points: 0 };
   displayUserInfo();
}

function showLogin() {
   document.getElementById("login").style.display = "block";
   document.getElementById("register").style.display = "none";
}

function showRegister() {
   document.getElementById("login").style.display = "none";
   document.getElementById("register").style.display = "block";
}

function showSection(sectionId) {
```

```javascript
    document.querySelectorAll(".section").forEach(section => section.style.display = "none");
    document.getElementById(sectionId).style.display = "block";
}

function loadMatches() {
    const matches = [
        { id: 1, match: "Arsenal vs Man City", date: "Jan 18, 2025" },
        { id: 2, match: "Real Madrid vs Barcelona", date: "Jan 19, 2025" },
        { id: 3, match: "Liverpool vs Chelsea", date: "Jan 20, 2025" },
        { id: 4, match: "Bayern Munich vs PSG", date: "Jan 22, 2025" },
        { id: 5, match: "Juventus vs AC Milan", date: "Jan 25, 2025" }
    ];
    const matchListElement = document.getElementById("matchList");
    matchListElement.innerHTML = matches.map(
        match => `<div class='match-item'>
                ${match.match} - ${match.date}
                <a href="javascript:void(0);" onclick="showBettingOptions(${match.id})">Place a
Bet</a>
            </div>`
    ).join("");
}

const coupons = [
    {
        name: "Nike Shoes",
        points: 100,
        code: "NIKESH123"
    },
    {
        name: "Adidas T-Shirt",
        points: 50,
        code: "ADIDAS456"
    },
    {
        name: "Apple Watch",
        points: 150,
        code: "APPLE789"
    }
];

function loadCoupons() {
    const couponsList = document.getElementById("couponsList");
    couponsList.innerHTML = coupons.map(coupon => {
        const redeemedCoupons = JSON.parse(localStorage.getItem("redeemedCoupons")) || [];
```

```javascript
      const isRedeemed = redeemedCoupons.includes(coupon.code);

      return `
        <div class='coupon-item'>
           <p>${coupon.name} - ${coupon.points} Points</p>
           <button onclick="redeemCoupon(${coupon.points}, '${coupon.code}')" ${isRedeemed
? 'disabled' : ''}>
               ${isRedeemed ? 'Redeemed' : 'Redeem'}
           </button>
        </div>
      `;
   }).join("");
}
function redeemCoupon(requiredPoints, code) {

  if (currentUser.points < requiredPoints) {
     alert("Not enough points to redeem this coupon.");
     return;
   }

   const redeemedCoupons = JSON.parse(localStorage.getItem("redeemedCoupons")) || [];

 if (redeemedCoupons.includes(code)) {
     alert("You have already redeemed this coupon.");
     return;
   }

   currentUser.points -= requiredPoints;
   localStorage.setItem("currentUser", JSON.stringify(currentUser));


   redeemedCoupons.push(code);
   localStorage.setItem("redeemedCoupons", JSON.stringify(redeemedCoupons));

   alert(`Coupon redeemed! Your code: ${code}`);


   displayUserInfo();
   loadCoupons();
}

function showBettingOptions(matchId) {
   const bettingOptions = `
      <h3>Betting Options for Match ${matchId}</h3>
```

```
      <label><input type="radio" name="offside${matchId}" /> Offside</label>
      <label><input type="radio" name="offside${matchId}" /> No Offside</label><br>
      <label><input type="radio" name="redCard${matchId}" /> Red Card</label>
      <label><input type="radio" name="redCard${matchId}" /> No Red Card</label><br>
      <label><input type="radio" name="goal${matchId}" /> Goal</label>
      <label><input type="radio" name="goal${matchId}" /> No Goal</label><br>
      <label><input type="radio" name="penalty${matchId}" /> Penalty</label>
      <label><input type="radio" name="penalty${matchId}" /> No Penalty</label><br>
      <button onclick="placeBet(${matchId})">Place Bet</button>
      <button onclick="showSection('matches')">Back to Matches</button>
    `;
    document.getElementById("bettingOptionsContent").innerHTML = bettingOptions;
    showSection('bettingOptions');
}


function placeBet(matchId) {
    if (currentUser.username === "Guest") {
        alert("Please log in to place a bet.");
        return;
    }

    const betOutcomes = {
        offside: Math.random() > 0.5,
        redCard: Math.random() > 0.5,
        goal: Math.random() > 0.5,
        penalty: Math.random() > 0.5
    };

    let betDetails = `Bet on Match ${matchId} with selected options: `;
    let pointsAwarded = 0;

    ["offside", "redCard", "goal", "penalty"].forEach(option => {
        const selected = document.querySelector(`input[name="${option}${matchId}"]:checked`);
        if (selected) {
            betDetails += `${option}: ${selected.nextSibling.textContent}; `;
            if (betOutcomes[option]) {
                pointsAwarded += 30; // Award 30 points for each correct selection
            }
        }
    });

    if (pointsAwarded > 0) {
        alert(`${betDetails} You won your bet! You earned ${pointsAwarded} points.`);
    } else {
```

```
    alert(`${betDetails} You lost your bet. Better luck next time!`);
  }
  currentUser.points += pointsAwarded;
  localStorage.setItem("currentUser", JSON.stringify(currentUser));
  displayUserInfo();
}
window.onload = function () {
  displayUserInfo();
  loadMatches();
  loadCoupons();
};
```

J. CSS - VARBET

```css
/* Global Styles */
body {
  font-family: Arial, sans-serif;
  background-color: #f4f4f9;
  margin: 0;
  padding: 0;
}

.coupon-item {
  background-color: #fff;
  padding: 10px;
  margin: 10px 0;
  border: 1px solid #ddd;
  border-radius: 4px;
}

button {
  padding: 8px 15px;
  background-color: #4CAF50;
  color: white;
  border: none;
  cursor: pointer;
}

button:disabled {
  background-color: #ddd;
  cursor: not-allowed;
}

.navbar {
```

```css
    background-color: #333;
    padding: 10px;
    display: flex;
    justify-content: space-between;
    align-items: center;
    color: white;
}

.navbar a {
    color: white;
    padding: 14px 20px;
    text-decoration: none;
}

.navbar a:hover {
    background-color: #ddd;
    color: black;
}

#usernameDisplay {
    font-size: 18px;
}

button {
    padding: 10px 20px;
    background-color: #4CAF50;
    color: white;
    border: none;
    cursor: pointer;
    border-radius: 4px;
}

button:hover {
    background-color: #45a049;
}

button:focus {
    outline: none;
}

/* Sections */
.section {
    display: none;
    padding: 20px;
```

```css
}

#home {
    text-align: center;
}

.match-item, .coupon-item {
    background-color: #fff;
    margin: 10px 0;
    padding: 15px;
    border: 1px solid #ddd;
    border-radius: 4px;
    display: flex;
    justify-content: space-between;
    align-items: center;
    box-shadow: 0 4px 8px rgba(0, 0, 0, 0.1);
}

#bettingOptionsContent {
    padding: 20px;
    text-align: left;
}

input[type="radio"] {
    margin: 5px;
}

/* Login Page */
#login input {
    padding: 10px;
    margin: 10px 0;
    width: 100%;
    max-width: 300px;
    border-radius: 4px;
    border: 1px solid #ccc;
}

#login button {
    width: 100%;
    max-width: 300px;
}

/* Coupons Section */
#couponsList {
```

```css
        padding: 20px;
}

#couponsList .coupon-item {
    display: flex;
    justify-content: space-between;
    align-items: center;
}

#couponsList .coupon-item button {
    margin-left: 10px;
}

/* Footer */
footer {
    background-color: #333;
    color: white;
    text-align: center;
    padding: 10px;
    position: fixed;
    width: 100%;
    bottom: 0;
}

/* Responsive Design */
@media (max-width: 768px) {
    .navbar {
        flex-direction: column;
        align-items: flex-start;
    }

    .match-item, .coupon-item {
        flex-direction: column;
        align-items: flex-start;
    }

    button {
        width: 100%;
    }

    #login input {
        width: 100%;
        max-width: none;
    }
```

```
    .section {
        padding: 15px;
    }
}
```

K. The Role of Technology in Football

Both technology and sports have the power to bring people together (Song et al., 2018). Although sports have seen numerous technological and/or digital advancements these advancements have had unfavourable effects (Caulfield and Jha, 2022; Samuel et al., 2020; Becker et al., 2022). Football has been greatly impacted by technological advancements, both in terms of growing worldwide viewing and changing the way games are refereed (IFAB, 2018; Ugondo & Tsokwa, 2019). Numerous technology technologies have been developed over time to help referees and assistant referees make accurate and equitable decisions. Refereeing disputes continued despite these advancements, leading to demands for stronger remedies (René, 2010; Ugondo & Tsokwa, 2019). Historically, match results have been impacted using human judgement; poor choices have occasionally changed the outcome of crucial games. FIFA implemented VAR technology in the 2018 FIFA World Cup in Russia as a solution to these issues, and the English Premier League (EPL) adopted it for the 2019–2020 season (Flores, 2018; Keogh, 2019). Although the goal of VAR was to increase justice, its use has generated discussions over its efficacy, consistency, and influence on game rhythm among players, coaches, and supporters.

Several sports have implemented Technological Officiating Aids (TOA) to improve officiating quality (Kolbinger and Lames, 2017). The Video Assistant Referee, or VAR, is one of the most well-known features in football (de Oliveira et al., 2023). After many years in which referee mistakes were excused as "part of the game," VAR was formally implemented in 2018. By protecting the integrity of the game and improving officiating, VAR aims to improve the fan experience (Stoney and Fletcher, 2021). The introduction of VAR was specifically intended to address significant refereeing errors. The VAR system was reformed in response to pressure from club owners and the media to enhance referee performance to establish justice and fairness (Simón, 2019). Although VAR won't be 100% accurate, the English Premier League (EPL) stated that it will improve decision-making and result in more fair and accurate judgement calls. International football referees typically make 137 decisions that are visible during a game (Helsen and Bultynck, 2004; Märtins et al., 2022). The game's result could be impacted by any errors the referee makes. Referees must make snap decisions in fast-paced, multi-player situations with little visibility, which makes their decision-making process difficult (Lex et al., 2015). Referees' choices may also be influenced by several additional circumstances. Perceptual constraints, crowd noise, fan influence, match location, and variations in teams' playing levels are a few of them (Unkelbach and Memmert, 2010; Oudejans et al., 2000; Buraimo et al., 2010; Wunderlich et al., 2021). Referee prejudice and judgement errors are therefore practically unavoidable. Numerous technical officiating aids have been progressively

implemented across a range of sports to correct errors and remove prejudice in refereeing judgements (Lago-Peñas and Gómez-López, 2016).

L. Referee Bias

One of the first studies on referee bias was carried out by Boyko et al. (2007), who used an ordinal regression model to analyse 5244 English Premier League (EPL) games with 50 referees. Their results showed that referees' home bias fluctuated, with notable variations in their choices about yellow cards and penalties. Home advantage, as determined by the goal differential between the home and away teams, was also impacted by specific referees (Boyko et al., 2007). The study did not, however, take crowd loudness into consideration, which led to requests for more investigation into the behavioural and psychological reactions of referees to biassed audiences (Boyko et al., 2007).

Lago-Peñas and Gómez-López (2016) investigated whether referees altered extra time according to match conditions to favour "big" teams. Referees shortened games when leading teams were ahead and prolonged games when stronger clubs were down, according to their study, which was based on 380 Spanish La Liga games played between 2014 and 2015 (Lago-Peñas & Gómez-López, 2016). Referees added more time when the stronger team was losing, but a linear analysis showed that higher score margins led to less extra time. The following factors were considered: attendance, substitutes, disciplinary actions, opponent strength, score differential, and fouls committed (Lago-Peñas & Gómez-López, 2016).

The changing use of technology in sports was examined in a narrative literature review, with particular attention paid to referee decision-making, spectator views, and emotional reactions. When incorporating new technology like VAR, fan and player satisfaction is vital because football, a significant entertainment sector, depends on viewership, attendance, and item sales (Mm & Nimkar, 2020). There are differing opinions about how technology and football interact; some supporters believe it is an essential innovation, while others contend it lessens the excitement of the game (Mm & Nimkar, 2020). While research has looked at how VAR affects gameplay, little of it has looked at how it affects players' and spectators' emotions. In addition to considering refereeing biases and historical technology improvements in football, future research should examine the psychological effects of VAR (Ezurmendia Álvarez & Valenzuela Saldías, 2021; Spitz et al., 2020; Tamir & Bar-Eli, 2021).

M. Case Study on VAR Decisions: Problems and Risk Analysis

Use Case 1: Arsenal vs. Crystal Palace, Oct 28, 2019

At a crucial 2-2 point in the Premier League, Greek centre back Sokratis Papastathopoulos scored a goal in the last seconds. When Calum Chambers, an Arsenal player, was involved in

the build-up to the goal, VAR chose to check for a foul, and the team celebrated the three points. The goal was declared disallowed following a protracted VAR delay, costing Arsenal three crucial points. Many football experts and journalists were unhappy with the incident since they generally believed that the foul never stood (Marsden, 2019).

Use Case 2: Chelsea vs. Arsenal, FA Cup Final, and August 2020

The Football Association (The FA) organises the FA Cup, also known as the Football Association Challenge Cup, as the domestic men's football competition in England. First played in the 1871–1872 season, it is the oldest national football competition in the world. All English football clubs, from level 1 to level 10, are eligible. A record 763 clubs participated in the tournament during the 2011–12 season. Every year, the winners of this cup advance directly to the Europa League the following year. This year's FA Cup final, which took place in an empty Wembley Stadium, pitted Chelsea against Arsenal. Christian Pulisic's brilliant finish gave Chelsea the lead in the first five minutes. Anthony Taylor, the on-field referee, booked Chelsea's Mateo Kovacic for a foul in minute 14. At minute 28, Pierre-Emerick Aubameyang, the captain of Arsenal, equalised with a penalty kick. Chelsea had to replace two of its key players by the conclusion of the first half due to injuries. Arsenal took the lead at minute 67 thanks to another goal from Aubameyang. Mateo Kovacic, who had already been booked, was sent off with a second yellow card, which is the same as a red card, shortly after the goal at minute 73 after the on-field referee recognised him for another foul. The incident's playback unequivocally demonstrates that what initially looked to be a foul—let alone a red card booking—was not. It was obvious that Kovacic had been sent off in error (Wilkinson, 2020).

Use Case 3: Manchester United vs. Norwich, Chelsea vs. Watford, Premier League 2019

In the Premier League match between Manchester United and Norwich, Ben Godfrey, the Norwich centre-back, fouled United winger Daniel James inside the D-box. The game continued after the on-field referee initially ruled there was no foul. Shortly after play started up again, VAR stepped in and told the referee on the pitch to take the foul into consideration. After that, the on-field referee reversed his original ruling and awarded Man United a penalty. Video replays showed that it was not at all a foul, and the on-field referee's original call ought to have been upheld. A similar situation occurred when Gerard Deulofeu, a winger for Watford, was easily taken down by Chelsea's Jorginho, and it appeared to be a dive from the outside. As play restarted, the on-field referee's first assessment was right on; there was no foul. But in the end, VAR stepped in, and the ruling was reversed (Storey, 2019).

Use Case 4: Brazil Vs. Belgium, World Cup 2018

It was the World Cup knockout stages. Due to their respective star-studded lineups, football fans worldwide expected Brazil and Belgium's quarter final showdown to be one of the most watched matches of the tournament. In the first half, Belgium had a 2-0 advantage. Belgian defender Vincent Kompany's sliding challenge sent Brazilian forward Gabriel Jesus to the

ground in the penalty box in the 55th minute of play. The on-field referee approached the VAR and personally reviewed the video on the field's VAR screen. After what appeared to be a protracted review, the referee chose to continue play and declared the challenge to be fair, depriving Brazil of a crucial penalty that could have changed the result of the game. On social media and television media platforms, politicians, analysts, and critics from all over the world continued to attack the decision (Murray, 2018).

Other Cases: Bundesliga & La Liga

The Bundesliga (Germany) employs stadium announcements for VAR decisions, enhancing transparency (Müller & Schmidt, 2023). La Liga (Spain) has faced challenges in consistency but has improved through better referee training and quicker reviews (Rodriguez, 2023).

N. Sampling

It is unlikely that the researcher will be able to gather information from every example in order to address the study questions. Therefore, choosing a sample is necessary. The population is the total number of cases from which the researcher selects a sample. Researchers use sampling techniques to lower the number of instances since they lack the time and resources to analyse the complete population (Taherdoost, 2016). Convenience sampling is the process of selecting study participants who are both readily available and willing to take part (Yu, 2007). Given the enormous sums of money they generate and the number of fans they serve, football clubs are the most well-known brands in the world today (Tapp, 2003). Even though this technology guarantees equity, certain teams, managers, and supporters have expressed dislike of this approach (Winand & Fergusson, 2018). The main worry is how it impacts their own team and the overall gaming experience. In addition to these assertions, FIFA believes that technology detracts from the game because it is not played in the same way around the world due to resource disparity (Tommy & Nicolas, 2021). Compared to other sports, football has been slow to embrace technology (Zglinski, 2020). It's because technology is costly and unreliable, but more significantly, it alters the flow and simplicity of how football should be played (Ryall, 2012).

The IFAB's 2018 introduction of VAR has also resulted in numerous football stoppages (Haugen, 2019). One of the most contentious and contested topics among all football fans is the offside rule and how this VAR system interprets it. When this technology was introduced in the English Premier League (EPL) in 2020, more than 34 goals were declared offside and required a referral or check by the Video Assistant Referee (VAR) system. Fans' attitudes and mindsets regarding VAR technology would have been affected by these judgements to award or deny goals utilising the technology (Mather, 2020). Another important consideration when discussing VAR rules is that the technology can only be applied in the event of a "serious missed incident" or a "clear and obvious error" in which the on-field official failed to see Zglinski (2020). Officials who have their decisions overturned suffer the consequences of their error, which may have a psychological effect on them (Zglinski, 2020).

One of the most crucial factors to consider in the football industry and from a management perspective is how the employment of VAR technology affects the spectator experience

(Tommy & Nicolas, 2021). Most supporters expressed satisfaction with Video Assistant Referee (VAR) technology after their club won a match, according to study done by Tommy and Nicolas (2021) on 15 different perspectives of VAR in the Premier League. Nonetheless, they stated that there is room for improvement and modification in the way this technology supports the on-field referee (Tommy & Nicolas, 2021). The length of time it took to make and finalise decisions was another important component in their study. Attending games in stadiums without TV screens or other monitors makes fans feel as though the game is taking longer (Tommy & Nicolas, 2021). Fans that sit in stadiums without completely comprehending why the game has been paused or why a decision is still pending can have a very frustrating experience, according to the research viewpoints mentioned above (Griggs & McGillick, 2022). Common themes related to VAR technology and procedure include the feeling of being "in the dark," accuracy, and destroying a football moment for supporters (Griggs & McGillick, 2022).

Summary

With billions of participants and supporters worldwide, football is the most popular sport. Although this greatly benefits the sport, it also gives rise to a wide range of ideas and perspectives on the game and how it ought to be played and improved. Football's adoption of Video Assistant Referee (VAR) was necessary at the time of deployment because of the game's increased complexity and speed, as well as fan pressure on FIFA to provide a remedy for bad decision-making. Huge interventions were required to help referees meet these demands because their choices may change the experiences of football fans and make or break a team with significant financial ramifications. Football communities have had differing opinions about the technology's adoption, despite the International Football Association Board's (IFAB) support for Video Assistant Referee (VAR) and its use to guarantee that football justice is upheld. The literature review highlights a number of difficulties, some of which are related to the extent to which this technology has changed the way football is played. Some contentious judgements that were always a part of this lovely game are eliminated by this technology, and the timing of such decisions can irritate teams, players, and spectators. Another feature of this technology is that it is meant to assist the referee on the pitch and only step in when there is a "seriously missed incident" or a "clear and obvious error." The phrase "clear and obvious error" combined with a gravely overlooked incident can occasionally be a very ambiguous directive, and research has shown that referees and matches perceive these terms differently. Important elements mentioned in the literature also have an impact on this technology's excessive 19 expenses and dependability. FIFA did not appreciate that this technology was brought to light because it is not viable for all leagues worldwide, which results in a varied football format. Additionally, when the on-field referee makes a mistaken judgement, Video Assistant Referee (VAR) stops them on the spot. This can have a significant psychological influence on their abilities and judgement for the remainder of the game. Although change is inevitable and can be beneficial, do football fans think that VAR has a place in the game going forward? Are they content with the way the technology has been implemented in football? Supporting or refuting the many theories that were found in the literature review would help this research report and provide it with a solid foundation for comprehending how the VAR technology affects football fans.

O. The Psychological and Social Impact of VAR on Fans and Referees

VAR's influence extends beyond technical decisions, affecting fan perception of referees. Fans may question the competence of on-field referees, leading to increased hostility (Haugen, 2019; Zglinski 2020). Winand et al. (2021) cite a 2017 France vs. Spain match where a VAR-overturned goal dampened fan celebrations, highlighting the emotional disconnect VAR can create. A study by Dufner et al. (2023) analysing the German Bundesliga found that VAR did not significantly alter performance metrics like goals, points, or yellow cards but may have reduced home advantage and improved fair play. The use of slow-motion replays in sports allows fans, commentators, and referees to scrutinize critical moments, yet studies suggest slow motion can distort reality and alter how movements and intent are perceived (Caruso et al., 2016). Research by Epley et al. (2004) and Gilbert (1989) shows that even when individuals are aware of an influencing factor like slow motion, they struggle to adjust their judgment. This has implications for referee training, as cognitive biases can lead to overly harsh decisions in slow-motion scenarios. Training programs, such as those by Catteeuw et al. (2010) and Put et al. (2015), aim to teach assistant referees how to compensate for perceptual mistakes in offside judgments. Football fans identify themselves with a football community by attending matches, wearing club colours, and chanting alongside others; therefore, social identity theory can be applied to them (Greenwood et al., 2006; Klugman, 2009). Fan-driven channels such as Manchester United Supporters' Trust, AFTV, and United Stand provide platforms for global football discussions. Spectators and fans engage differently, with fans showing higher emotional investment in teams, players, and leagues. The VAR system uses high-definition cameras, microphones, and advanced software to detect fouls, offsides, and handballs, aiming to improve refereeing accuracy (VAR Project Report, 2018). However, some studies indicate that VAR satisfaction is influenced by multiple factors, including the reputation of players, team bias, and referee perception (Garicano, 2005; Boyko, 2007). VAR has partially reduced home team bias in football matches (Holder, Ehrmann, and König (2022). The introduction of VAR in Serie A resulted in a significant decline in offside-related decisions, demonstrating its impact on gameplay regulation (Federcalcio & Hawk-Eye Innovations, 2018). However, VAR stoppages disrupt match flow and may psychologically affect referees whose decisions are overturned (Zglinski, 2020).

P. The Use of Video Technology in Referee Training

Given the complex nature of refereeing, errors are inevitable (Lex et al., 2015). Research suggests that effective referee training remains a challenge, with most programs relying on video clips of match scenarios for decision-making practice (Garicano, 2005; Boyko, 2007). However, training often lacks contextual elements, making it difficult for referees to develop real-world decision-making skills. Football has increasingly embraced technology for live broadcasts, officiating, and fan engagement. However, financial constraints often influence the implementation of new technologies in sports (Spitz et al., 2021; Brussels, 2014; Erdogan, 2021; Han et al., 2020). While technological advancements have improved fair play and referee confidence, their high costs and potential disruption to match flow remain contentious issues. The introduction of VAR has also affected game length. A Sky Sports report found that average game duration increased to 101 minutes and 41 seconds—a 3.5-minute rise from previous

seasons (Harris, 2024). English Premier League chief football officer Tony Scholes acknowledged concerns over VAR's impact on fan enjoyment and stressed the need for faster decision-making without compromising accuracy (Harris, 2024). VAR has altered the natural rhythm of football, raising concerns about its physiological and psychological effects on referees and players (Oliveira et al., 2021). Analysis of the 2014 World Cup (pre-VAR) and the 2018 World Cup (post-VAR) showed a decrease in sprinting efforts, indicating that VAR-induced stoppages may reduce physical intensity in games. While this study did not directly measure physical performance, it suggests that VAR changes the physical demands on players. Additionally, flow states in sports psychology emphasize uninterrupted play as a key factor in optimal athlete performance. According to Grant (2023), a flow state is a mental and physical condition where athletes feel immersed, in control, and perform optimally. Football, traditionally a continuous-flow sport, has been impacted by VAR stoppages, disrupting player momentum and fan engagement.