The Challenges of Digital Transformation of Communication Technologies:
The case of VAR and Human Errors in the English Premier League 2022 - 2023 season

Os desafios da transformação digital das tecnologias de comunicação: O caso do VAR e dos erros humanos na época 2022-2023 da Primeira Liga inglesa

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Abstract: The implementation of Video Assistant Referee (VAR) technology in football has brought about significant changes to the game, particularly in terms of communication and decision-making. However, despite its intended benefits, human errors by VAR officials have been a recurring problem that has affected the accuracy and effectiveness of the system. This study aims to examine the challenges of digital transformation of communication technologies, specifically the case of VAR and human errors in the English Premier League (EPL) during the 2022/2023 season. Using a qualitative content analysis approach, two instances of VAR human errors were analysed to identify the type of errors, the player/team affected, and the consequences of the errors. The findings suggest that VAR human errors can have significant implications for the game, affecting the outcome and fairness of matches. The study highlights the importance of addressing human errors in VAR implementation in order to improve the accuracy and effectiveness of the system and maintain the integrity of the game.

Keywords: VAR, digital transformation, communication technologies, human errors, English Premier League.

Resumo: A implementação da tecnologia do Árbitro Assistente de Vídeo (VAR) no futebol trouxe mudanças significativas ao jogo, particularmente em termos de comunicação e tomada de decisões. No entanto, apesar dos benefícios pretendidos, os erros humanos dos árbitros VAR têm sido um problema recorrente que tem afetado a precisão e a eficácia do sistema. Este estudo tem como objetivo examinar os desafios da transformação digital das tecnologias de comunicação, especificamente

o caso do VAR e dos erros humanos na *Premier League* inglesa (EPL) durante a temporada 2022/2023. Utilizando uma abordagem qualitativa de análise de conteúdo, foram analisadas duas instâncias de erros humanos do VAR para identificar o tipo de erros, o jogador/equipa afetado/a e as consequências dos erros. As conclusões sugerem que os erros humanos do VAR podem ter implicações significativas para o jogo, afetando o resultado e a equidade dos jogos. O estudo sublinha a importância de abordar os erros humanos na implementação do VAR, a fim de melhorar a exatidão e a eficácia do sistema e manter a integridade do jogo.

Palavras-chave: VAR, transformação digital, tecnologias de comunicação, erros humanos, Premier League inglesa.

Résumé : L'implémentation de la technologie de l'assistant vidéo à l'arbitrage (VAR) dans le football a apporté des changements significatifs au jeu, en particulier en termes de communication et de prise de décision. Cependant, malgré ses avantages, les erreurs humaines commises par les arbitres de la VAR ont été un problème récurrent qui a affecté l'efficacité du système. Cette étude vise à examiner les défis de la transformation digitale des technologies de communication, en particulier le cas de la VAR et des erreurs humaines dans la Premier League anglaise (EPL) lors de la saison 2022/2023. En utilisant une approche d'analyse de contenu qualitative, deux cas d'erreurs humaines de la VAR ont été analysés pour identifier le type d'erreurs, l'équipe/joueur affecté et les conséquences de ces erreurs. Les résultats suggèrent que les erreurs humaines de la VAR peuvent avoir des implications significatives pour le jeu, affectant le résultat et l'équité des matches. L'étude souligne l'importance de traiter les erreurs humaines dans l'implémentation de la VAR afin d'améliorer l'exactitude du système et de maintenir l'intégrité du jeu.

Mots-clés : VAR, transformation digitale, technologies de communication, erreurs humaines, Premier League anglaise.

1. Introduction

1.1. Background and context of digital transformation in football

Football has never been a calm visitor for the digital wave; it has always welcomed many upgrades in its areas using digital tools that made its performance rise to superior levels. During the last 15 years football clubs continued to use social media platforms as necessary means to acquire attraction, fan engagement is skyrocketing each year and communication between club and fan has become an easy target to achieve, using various techniques related to community management and social media marketing.

On the technical side, club' staff inside the technical departments, tasked with conducting tactical analysis, physical assessments and conquering performance related objectives, are using high quality digital software designed to help them with their duties. Directors of football are using the latest artificial intelligence applications that demonstrate football operations in a much less-complicated way than ever before.

There are many other examples to mention, nevertheless, it is important to understand that football organizations have adopted digital technologies to improve their ways and enhance the experience of their staff, coaches, players and fans.

Studies have confirmed the impact of these digital technologies in a field such as football; they have included the examples of video analysis, player tracking systems, and fan engagement platforms. They have also highlighted their benefits for such establishments and that includes improving their decision-making, increasing their revenue and enhancing their communication with their environment.

The works of David Dellea and co. for instance focused on specific football areas in which digital transformation has impacted the most. Crowdsourcing, audience development, match data/wearables and the transfer market constituted for the writers the main four categories related to football and influenced heavily by digital aspects.

"*The most notable aspect of this evolution is the rapidly increasing use of social media*" (Dellea, et al., 2014), they continue by adding that "*the digital transformation – and the technology that fuels it – has enabled fans to interact with their club way beyond the 90 minutes of the actual matches themselves*". This quote proves itself throughout the current trends football clubs use in order to activate their contact with their fanbases. Long gone are the days in which a fan is satisfied with attending the stadium or watching a match via TV, a club feels the necessity to produce more content in the build-up to a game or after it, and a supporter feels the urgent need to consume such content.

Instagram stories and Facebook reels for example are being used in an effective way to showcase products and services that can be provided by a football club, offering the chance to buy t-shirts and training kits has been an ordinary procedure

as it has always been consulted by the fans in the regular stores near the stadium or in the kit sponsor brand shops all around the globe. Nowadays, it is enough to click on the commercial announcement published in such platforms and fans can order the articles they desire to purchase online.

The earlier example is one of many, digital platforms utilized by football organizations are offering behind the scenes access to their team's preparations, specialized viewing angles of matches that are capturing interest from fans wanting to watch additional content, in addition to special interviews or friendly contests between players that are due to straighten the bond with the supporters and offer that needed sense of belonging.

As a conclusion, football as a global institution, with all of its federations and independent organizations, is undergoing this kind of transformation at all levels, from low-level to high-level leagues, and the challenge is to deal with the adaptation process in order to satisfy all parties involved in the actions that clubs are undergoing:

> "*For example, while fans watch a football match in a stadium, they expect the technological infrastructure to check real-time statistics on their smartphones and chat with other fans in the stadium. Therefore, stadium operators install high-speed Wi-Fi services and offer their own stadium apps. They provide digital platforms to share the latest match day news or to take orders for food or beverages. Furthermore, professional sports organizations rely on a large digital backbone, such as ticketing systems, athlete tracking infrastructure, e-commerce solutions and employee databases*." (Ströbel, Stieler, & Stegmann, 2021).

1.2. Overview of communication technologies and VAR

Football is a sport that involves communication, "*it is understood that footballers' communication with coaches, managers and between each other is very important to door to the success and achieve a common goal*" (Sahan, Ulukan, Temel, Ulukan, & Sahin, 2012).

"*Sportsmen who have higher education overcome this problem* (the existence of many people in team sports) *by talking easily*". They continue saying: "*Every*

team applies tactic or technical training. The point which effects team's performance is being lack of communication" (Sahan, Ulukan, Temel, Ulukan, & Sahin, 2012).

At the end of their study, Sahan and co. summarized that successful team's sportsmen have good communication both with the trainers and the managers. Therefore, communication is important in team's performance.

Adding to that, communication does not only involve players and coaches during a football game, it constitutes a crucial ingredient for the referees. Although, the latter is always under massive pressure when doing his job because of the higher implications following the decisions he takes during matches. The fate of football teams playing in a game is in the referee's hands, and for him to be able to judge an instance fairly, as well as to deliver consistency, is a tough challenge. "*Attitude to the fairness of decisions is often influenced by attitude to the decision maker*" Simmons adds: "*Football referees communicate hundreds of decisions in each game and perceptions of fairness are difficult to achieve*". (Simmons, 2011).

Practically, Football officials are invited to make crucial decisions during a match; such decisions are impacting the result and may impact a whole season for football clubs. There are certain instances of play in which the designated referee is found subjective in making his decisions, and that is down to multiple factors accumulating at once; the complexity of refereeing rules, the subjective nature of the foul committed, the pressure of the players and managers including the constant shouting of fans, all of these actions proved to be pivotal in pressurizing referees and making them resort into non-fair decisions. The footballing federations recognized the fact that referees have a major weight on their shoulders and the process of inventing a technology that would facilitate decision making was underway. "*We knew we had to protect the referees from making mistakes that everyone can see immediately*" declares Lukas Brud, IFAB secretary at the International Football Association (IFAB). "*With all the 4G and Wi-Fi in stadiums today, the referee is the only person who can't see exactly what is happening and he's actually the only one who should,*". Conceived as part of an ambitious project conducted by the Royal Netherlands Football Association (KNVB), the Video

Assistant Referee (VAR) system has an aim to reinvent refereeing. (Medeiros, 2018).

VAR is a video replay technology that assists referees in making decisions during football matches. The system has been adopted in major football leagues across the world, including the English Premier League, La Liga, and Serie A, among others.

VAR operates through a communication network that links the on-field referee to a team of video assistant referees located in a central location. The video assistant referees analyze video footage of critical incidents and provide the on-field referee with information to make decisions on incidents such as goals, penalty decisions, and red card incidents. The system aims to increase the accuracy of decisions made by referees during matches and reduce the likelihood of errors.

However, the implementation of VAR has not been without challenges as the data from the 2022/2023 EPL season suggests (Johnson, 2023). Despite the system's effectiveness in reducing errors, the numbers demonstrate instances of human errors, controversial decisions, and the need for continuous improvement in the VAR system to ensure fair and accurate outcomes in football matches:

- Total overturns: The high number of 116 overturns suggests that VAR has been actively involved in reviewing and potentially altering on-field decisions. This indicates that there is room for improvement in the accuracy of initial decisions made by referees.

- Rejected overturns: The presence of 4 rejected overturns implies that there were instances where VAR was unable to correct a potentially incorrect decision. This highlights the limitations and challenges faced by VAR in certain situations.

- Leading to goals and disallowed goals: The figures of 33 goals resulting from VAR intervention and 55 goals being disallowed demonstrate the significant impact VAR has on the outcome of matches. These numbers indicate that VAR decisions can directly influence the course of a game, leading to controversies and debates when goals are allowed or disallowed based on VAR reviews.

- Penalties awarded and overturned: The data shows that 26 penalties were awarded, but 12 of them were overturned. This highlights the complexity of determining penalties accurately, which can result in human errors by VAR referees. The fact that penalties can be overturned suggests the need for consistent and precise decision-making in penalty situations.

- Goals ruled out for offside and incorrect offside decisions: With 35 goals ruled out for offside and 14 goals being awarded after incorrect offside decisions, it is evident that VAR encounters challenges when making offside judgments. The margin for error in offside decisions can lead to human errors, impacting the fairness and integrity of the game.

- Red cards and overturned red cards: The presence of 6 red cards and 3 overturned red cards signifies the involvement of VAR in reviewing potential red card incidents. The overturning of red cards indicates that VAR referees may have made errors in their initial judgments, further highlighting the challenges of consistent and accurate decision-making.

1.3. Importance of studying human errors in VAR implementation

Studying human errors in VAR implementation is important for several reasons.

First, it can help to identify the specific types of errors that occur, regarding offside lines, violent conduct instances or basic football situations that go under the radar. It can also help figuring out the factors that contribute to these errors, as this information can be used to develop strategies to minimize the occurrence of errors and to improve the accuracy and effectiveness of the VAR system.

Second, understanding the impact of human errors on the outcome of matches is important for ensuring that the results are fair and unbiased. Throughout our study, we have found that VAR referees can be caught in many distractions during their duties that they may forget to judge an instance to its full potential, as it happened in one of the cases we have analyzed.

Third, it can help to improve the overall credibility and trust in the VAR system, as football fans will have greater confidence in the system if they believe that it is being used correctly and effectively.

Finally, by addressing the issue of human errors in VAR implementation, it is possible to enhance the overall quality of the football viewing experience, as fans will be able to enjoy matches that are fair and transparent, with decisions that are based on clear and objective evidence.

1.4. Research questions and objectives

Our research questions are the following:

- What are the major instances of human errors committed by VAR referees during the 2022/2023 EPL season?
- What are the factors contributing to these human errors?
- What are the implication of these human errors for the accuracy and effectiveness of VAR implementation?
- What are the recommendations for improving the performance of VAR referees?

We plan to identify and analyze two major instances of human errors committed by VAR officials; in addition, we will explore the factors contributing to these errors while examining their implications, and finally provide recommendations for ameliorating VAR for future seasons.

2. Literature Review

2.1. Digital transformation and communication technologies in football

Several studies have investigated the impact of digital technologies on football, including VAR implementation. The study by (Metelski & Leszczynski, 2022) focused on the impact of digital transformation on football based on social media and found that digital technologies have changed the way football is identified, with greater emphasis on analyzing the number of followers and commercial aspects. Another study by (South, 2022) explored the impact of VAR on players' and fans' emotional experience and found that VAR has had a mixed impact on the game, with some positive and negative effects.

Communication technologies, such as VAR, have been widely studied in football. One study by (Spitz, Wagemans, Memmert, Williams, & Helsen, 2021)

explored the impact of VAR on the accuracy of decision-making and found that VAR has improved the accuracy of decision-making in football, particularly in relation to offside decisions. However, another study by (Zhang, et al., 2022) found that VAR has had a negative impact on the game, leading to longer stoppages in play and increased frustration among fans.

2.2. The role of VAR in football

The role of VAR in football has been a subject of debate, with some arguing that it has improved the accuracy of decisions, while others claim that it has led to more confusion and controversy.

One study conducted by (Aarnink, 2021) analyzed the effect of VAR on players' sabotage behavior and found that players were less likely to engage in violent behavior or unsportsmanlike conduct when VAR was present. Another study by (Samuel, Galily, Filho, & Tenenbaum, 2020) found that the use of VAR had a positive impact on the accuracy of referee decisions and led to a reduction in the number of incorrect decisions.

However, the implementation of VAR has also led to some unintended consequences. A study by (Digital Mahbub, 2022) found that the use of VAR had a negative impact on the flow of the game, as it increased the time taken for decisions to be made and disrupted the rhythm of play. Another study by (Hamsund & Scelles, 2021) found that the use of VAR had a negative impact on fan perceptions of the game, as it led to increased frustration and confusion.

2.3. Previous studies on human errors in VAR implementation

Previous studies have explored the impact of human error on the effectiveness of the VAR system in football.

For example, a study by (Chen & Davidson, 2021) investigated the manager perceptions of VAR decisions in the English Premier League (EPL) during the 2019/2020 season. The study found that human errors by VAR referees led to incorrect decisions, which had a negative impact on the overall accuracy of the system.

Similarly, a study by (Han, Chen, Peñas, Wang, & Lui, 2020) focused on the implementation of VAR in the Chinese Super League (CSL) during the 2018 season. The study found that VAR implementation was associated with a reduction in the number of incorrect decisions made by referees. However, human error by VAR referees still occurred and had a negative impact on the accuracy of the system.

Another study by (Gürler & Volkan, 2021) investigated the implementation of VAR in the Turkish Super League (TSL) since the 2017/2018 season. The study found that human errors by VAR referees were a significant factor in the system's effectiveness. The study recommended that measures be taken to address human error in VAR implementation.

These studies highlight the importance of addressing human error in the implementation of VAR in football. While VAR has the potential to improve the accuracy of refereeing decisions, human errors can have a negative impact on the system's effectiveness. Therefore, it is essential to identify the factors contributing to human error by VAR referees and develop strategies to address them.

2.4. Gaps and limitations in the literature

The current literature on VAR implementation and human errors in football has made significant strides in understanding the challenges and opportunities presented by digital transformation and communication technologies. However, there remain several gaps and limitations in the existing research that need to be addressed.

One limitation is what we found to be a lack of consensus on the definition of human errors in the context of VAR, which makes it difficult to compare and aggregate results across studies. Additionally, while several studies have focused on the impact of human errors on the accuracy and fairness of decision-making in football, there is a need for more research on the psychological and social factors that contribute to human errors in VAR implementation.

3. Methodology

3.1. Qualitative content analysis of video recordings of two VAR instances

The qualitative content analysis of video recordings of two VAR instances will be conducted using a thematic analysis approach. The two instances that will be analyzed were previously selected based on their impact on the game/season and the controversy surrounding the decisions made by the VAR referees.

Next, we will be determining the type of errors, the player/team affected, and the consequences of the errors. We will also be considering the context of the game, including the match score, time of the incident, and the referee's decision on the field.

The video recordings will be analyzed multiple times to ensure accuracy and consistency in the analysis process. Each instance will be analyzed separately, and they will be compared and contrasted to identify commonalities and differences.

The data analysis will be conducted through a written analysis, which will present the findings of the thematic analysis in a narrative format. The findings will be supported by evidence from the video recordings, including timestamps and screenshots.

The written analysis will conclude with a discussion of the implications of the findings for the accuracy and effectiveness of VAR implementation in football. It will also provide recommendations for improving the performance of VAR referees to minimize human errors in the future.

3.2. Data analysis method for the written analysis of the two instances

The first step we took is to familiarize ourselves with the data via watching the instances destined to be analyzed in a repeated fashion, this is to ensure that all important details are noted and a thorough understanding of the context is achieved.

The second step is to code these instances based on the type of error committed, the team or player affected and the consequences of the error. Thirdly, search for patterns or themes accomplished between the analyzed instances in order to determine existing similarities or differences.

The fourth step is to review and refine the themes. This involves analyzing each theme in more detail to ensure that all relevant data is captured and that the themes accurately reflect the content of the data. The final step is to interpret the findings and

draw conclusions based on the themes that have emerged from the data. This involves synthesizing the themes into a coherent narrative that answers the research question.

4. Results

4.1. Detailed analysis of the two VAR instances

In the 2022/2023 English Premier League season, two games in particular, Crystal Palace vs. Brighton and Arsenal vs. Brentford, experienced controversial VAR decisions that were later attributed to human errors. Here is a detailed narrative analysis of the human error instances committed in both of these games:

4.1.1. *Crystal Palace vs Brighton:*

In this match, there was one key instance where a VAR decision was deemed unfair due to a human error:

Disallowed goal: Brighton scored a goal in the second half, which was initially given by the on-field referee.

Action N°1: Brighton winger Solly March passing the ball to colleague Pervis Estupiñán creating a clear goal-scoring opportunity

Action N°2: Fullback Pervis Estupiñán finishing the action and scoring a goal

However, the VAR referee intervened and disallowed the goal, citing a marginal offside in the build-up.

Action N°3: Conclusion of VAR review in which it was deemed as an offside

Replays later showed that the decision was incorrect, as the Brighton player was level with the last defender when the pass was played.

Zoomed in picture of the offside call by the VAR referee, indicating the existence of another Crystal Palace defender breaking the offside line, thus, making the goal legitimate

The human error in this case was the misinterpretation of the offside rule by the VAR referee, which led to an unfair decision against Brighton.

4.1.2. Arsenal vs Brentford:

In this match, there was one major instance where a VAR decision was considered unfair due to human error:

Offside goal allowed: Brentford scored a goal in the second half, which was allowed by the on-field referee.

Action N°1: Brentford defender Ethan Pinnock passes the ball to midfielder colleague Christian Nørgaard creating an opportunity for a tap-in pass
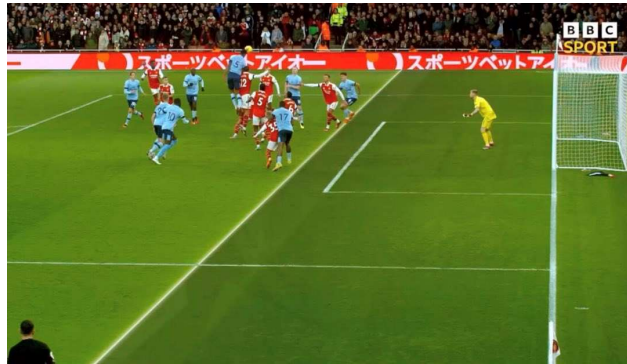

Action N°2: Nørgaard manages to get the ball for fellow striker Ivan Toney for a tap-in goal

Action N°3: Toney manages to score easily

However, to check if there was any infringement during the goal scoring action, the VAR referee reviewed the decision and ended up confirming the on-field referee's call. Nevertheless, replays later showed that Christian Nørgaard was offside when the pass was played.

Zoomed in image of the instance when Pinnock passed the ball to Nørgaard and the latter being in an offside position, observed via drawing a straight line on the receiver's foot

The human error in this case was the VAR referee's failure to draw the offside line on the last Arsenal defender and comparing it with the positioning of the Brentford player that passed the ball to the scorer, which would have ended as a disallowed goal, meaning that an unfair decision took place against Arsenal.

In both games, the human errors committed by the VAR referees had a significant impact on the final results. These instances highlight the challenges that football faces in its digital transformation, particularly in the implementation of VAR technology.

4.2. Identification and discussion of the type of errors, the player/team affected, and the consequences of the errors

In the two analyzed matches, Crystal Palace vs. Brighton and Arsenal vs. Brentford, the primary type of error committed by VAR referees was the misinterpretation of the offside rule. Here is a detailed identification and discussion of this error, the players and teams affected, and its consequences:

- Crystal Palace vs. Brighton: The disallowed goal for Brighton occurred due to the VAR referee's misinterpretation of the offside rule. The player affected was the Brighton fullback Pervis Estupiñán who scored the goal. The team affected was Brighton, as they were denied a legitimate goal. The consequence of this error was that Brighton lost the match, which could have impacted their league standings and overall performance in the season (currently fighting for a place for European competitions and seeing that the

game ended in a draw, missing out on two points could break their challenge for the spots they want to be in).

- Arsenal vs. Brentford: The allowed goal for Brentford was also a result of the VAR referee's misinterpretation of the offside rule. The player affected was the Arsenal fullback Ben White; deemed to have broken the offside. The team affected was Arsenal, as they conceded a non-legitimate goal. The consequence of this error was that Arsenal may have lost two crucial points in the match, which could have affected their league standings and overall performance in the season (currently fighting for the Premier League title with one point for a difference between them and Manchester City, if these two points were gained for Arsenal, they would have been in pole position at the current date of this study).

5. Discussion

5.1. Implications of the findings for the accuracy and effectiveness of VAR implementation

5.1.1. Types of errors and their implications

The analysis of the Brighton vs. Crystal Palace and Arsenal vs. Brentford matches revealed one main type of error committed by VAR referees, which is a judgment error.

Judgment errors refer to instances where the VAR referee misinterprets the rules or fails to apply them correctly; on the other hand, it could have been the cause of technical errors that may have involved issues with the technology itself, such as camera angles or system glitches.

These types of errors have significant implications for the accuracy and effectiveness of VAR as a digital communication technology. Judgment errors highlight the need for better training and support for VAR referees to ensure they have a thorough understanding of the rules and can apply them consistently. Technical errors, however, emphasize the importance of continuous improvement and investment in the technology to minimize the risk of system failures and inaccuracies.

5.1.2. Impact on players and teams

The consequences of VAR errors can be far-reaching, affecting not only the outcome of individual matches but also the overall standings and reputation of the teams involved. In the analysed matches, both Brighton and Arsenal were negatively impacted by VAR errors, leading to incorrect decisions that altered the course of the game. This raises concerns about the fairness and integrity of the competition, as well as the potential for such errors to undermine the credibility of the league and its digital communication technologies.
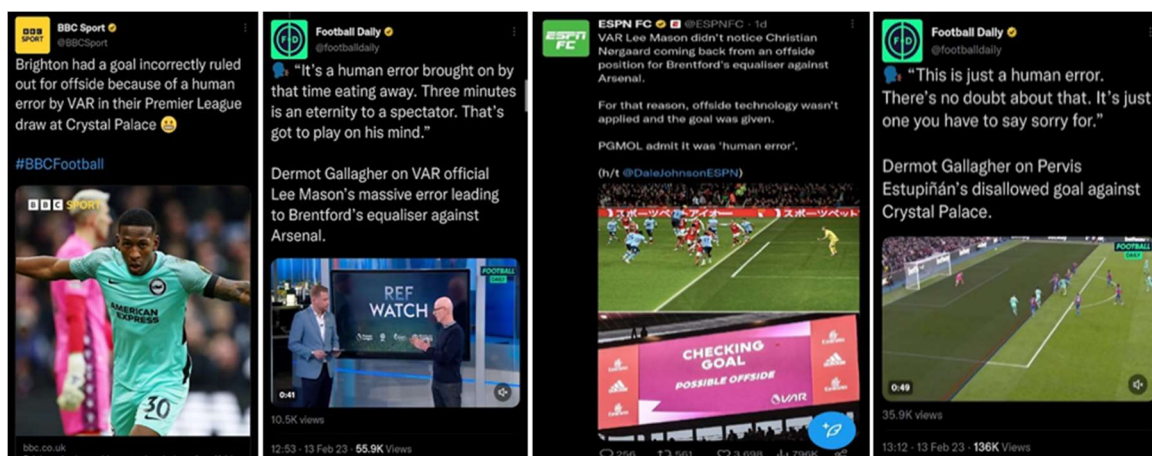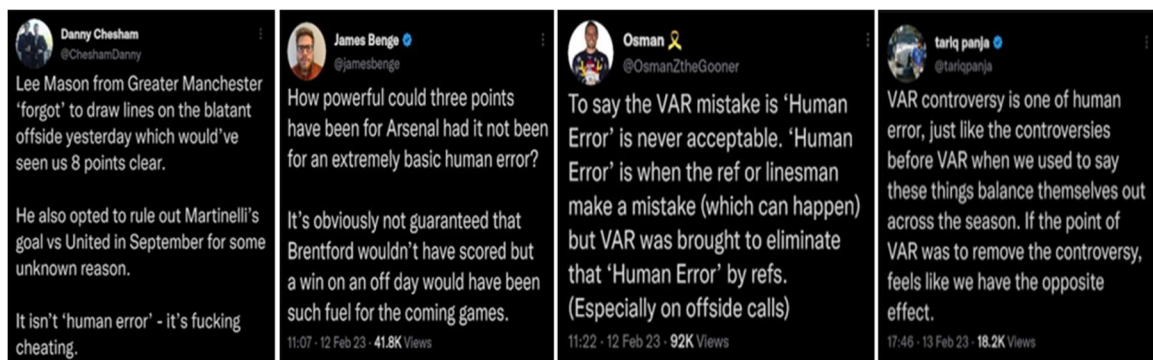
After both of the games, the body responsible for the implementation for such decisions and fielding competent officials for refereeing the matches, the PGMOL, issued a statement in which it confirmed that it has "*contacted both Arsenal and Brighton & Hove Albion to acknowledge and explain the significant errors in the VAR process in their respective Premier League fixtures*". They continued: "*Both incidents, which were due to human error and related to the analysis of offside situations, are being thoroughly reviewed by the PGMOL*". (PGMOL, 2023).

PGMOL representative and retired English association football referee Chris Foy declared that "*VAR didn't fully investigate with the lines (for the Arsenal match). The lines, simply, didn't go down. And that counts as human error. Had the lines gone down the goal would have been disallowed for offside*". (Sky Sports, 2023)

Although, the general public, especially on social media platforms, refused to accept their approach with most media organizations and football fans demanding Premier League officials for a broader communication policy while reviewing VAR instances.

5.1.3. Impact on the media, football fans and supporters

Social media platforms embraced the impact of these human errors conducted in such crucial matches and continued to debate on the subject of referees' competence, highlighting that the VAR technology came with an intention to remove any sort of errors that are outside the technical parameters. Here are some of the reactions on Twitter:

(Football Daily, 2023)[1] (ESPN FC, 2023)[2] (Football Daily, 2023)[3] (BBC Sport, 2023)[4]

(Chesham, 2023)[5] (Benge, 2023)[6] (Osman, 2023)[7] (Panja, 2023)[8]

[1] Football Daily. [@footballdaily]. (2023, February 13). *"This is just a human error. There's no doubt about that. It's just one you have to say sorry for."* [Tweet]. Twitter. https://twitter.com/footballdaily/status/1625105741521604608?lang=en

[2] ESPN FC. [@ESPNFC]. (2023, February 12). *VAR Lee Mason didn't notice Christian Nørgaard coming back from an offside position for Brentford's equaliser against Arsenal.* [Tweet]. Twitter. https://twitter.com/ESPNFC/status/1624769038885814273?lang=en

[3] Football Daily. [@footballdaily]. (2023, February 13). *"It's a human error brought on by that time eating away. Three minutes is an eternity to a spectator."* [Tweet]. Twitter. https://twitter.com/footballdaily/status/1625100772848373761?lang=en

[4] BBC Sport. [@BBCSport]. (2023, February 11). *Brighton had a goal incorrectly ruled out for offside because of a human error by VAR.* [Tweet]. Twitter. https://twitter.com/BBCSport/status/1624533912939634688?lang=en

[5] Chesham, D. [@CheshamDanny]. (2023, February 12). *Lee Mason from Greater Manchester 'forgot' to draw lines on the blatant offside yesterday.* [Tweet]. Twitter. https://twitter.com/CheshamDanny/status/1624722748034494464

[6] Benge, J. [@jamesbenge]. (2023, February 12). *How powerful could three points have been for Arsenal had it not been for an extremely basic human error?* [Tweet]. Twitter. https://twitter.com/jamesbenge/status/1624711713164500992

[7] Osman. [@OsmanZtheGooner]. (2023, February 12). *To say the VAR mistake is 'Human Error' is never acceptable.* [Tweet]. Twitter. https://twitter.com/OsmanZtheGooner/status/1624715612684525570?lang=en

[8] Panja, T. [@tariqpanja]. (2023, February 13). *VAR controversy is one of human error, just like the controversies before VAR.* [Tweet]. Twitter. https://twitter.com/tariqpanja/status/1625174502941372416?lang=en

Additionally, football fans on social media have been questioning the process of accountability regarding match officials. A Twitter user called out the PGMOL asking about "*the process of accountability and improvement…*" and stating an example of referee "*Lee Mason* (getting) *an admitted call wrong on VAR* (for the Arsenal vs. Manchester United match) *but then he gets another of their matches? How can the process on VAR's fundamental function (offsides) be so poor?*" he asks.

5.1.4. *Broader implications for digital transformation in sports*

The challenges faced by VAR implementation in the English Premier League serve as a case study for the broader digital transformation of communication technologies in sports. As more leagues and competitions adopt digital technologies to enhance decision-making and communication, it is crucial to learn from the experiences of early adopters like the Premier League.

Key lessons from the VAR case include the importance of investing in training and support for referees, continuous improvement of the technology, and transparent communication with stakeholders (including players, teams, and fans) about the limitations and potential pitfalls of digital communication technologies. By addressing these challenges proactively, sports organizations can maximize the benefits of digital transformation while minimizing the risks associated with human errors and technological shortcomings.

5.2. Recommendations for improving the performance of VAR referees

Based on the findings and implications discussed earlier, the following recommendations can be made to improve the performance of VAR referees and enhance the overall effectiveness of the VAR system:

5.2.1. *Enhanced training programs*

Develop comprehensive training programs for VAR referees that focus on the correct interpretation and application of the rules, as well as the effective use of the VAR technology. This should include regular workshops, simulations, and assessments to ensure that referees are well-prepared and up-to-date with the latest developments in the field.

5.2.2. Clear guidelines and protocols

Establish clear guidelines and protocols for VAR referees to follow during matches, including standardized procedures for reviewing incidents, communicating with on-field referees, and making final decisions. This will help to minimize inconsistencies and judgment errors, as well as promote transparency and accountability in the decision-making process.

5.2.3. Collaboration and peer review

Encourage collaboration and peer review among VAR referees, both during matches and in post-match debriefings. This can help to identify areas for improvement, share best practices, and foster a culture of continuous learning and development within the refereeing community.

5.2.4. Technological improvements

Invest in on-going research and development to enhance the accuracy and reliability of the VAR technology, including improvements in camera angles, image quality, and system performance. This will help to minimize technical errors and ensure that VAR referees have access to the best possible information when making decisions.

5.2.5. Real-time feedback and support

Provide VAR referees with real-time feedback and support during matches, such as access to expert advice or additional resources, to help them make more informed decisions and minimize the risk of errors. This could include the use of dedicated VAR coaches or mentors who can offer guidance and support as needed.

5.2.6. Transparent communication

Improve communication between VAR referees, on-field referees, players, teams, and fans to promote understanding and trust in the VAR system. This could include the use of in-stadium announcements, post-match explanations, or public reports to provide greater insight into the decision-making process and the rationale behind specific VAR decisions.

5.2.7. Performance monitoring and evaluation

Implement a robust performance monitoring and evaluation system for VAR referees, including regular assessments, feedback, and opportunities for professional development. This will help to identify areas for improvement, recognize and reward high-performing referees, and ensure that the highest standards of performance are maintained across the VAR system.

By implementing these recommendations, the performance of VAR referees can be significantly improved, leading to more accurate and effective decision-making, greater trust in the VAR system, and ultimately, a more fair and enjoyable experience for all stakeholders involved in the sport.

5.3. Implications for future research on VAR implementation in football

The findings and recommendations presented in this discussion chapter have several implications for future research on VAR implementation in football. These implications can help guide researchers in identifying new areas of inquiry, refining existing methodologies, and contributing to the on-going development and improvement of the VAR system. Some key implications for future research include:

5.3.1. Longitudinal studies

Conduct longitudinal studies to assess the impact of VAR implementation on decision-making, match outcomes, and overall league standings over time. This can help to identify trends, patterns, and potential areas for improvement in the VAR system, as well as evaluate the effectiveness of specific interventions or recommendations.

5.3.2. Comparative analysis

Undertake comparative analyses of VAR implementation across different leagues, competitions, and sports to identify best practices, common challenges, and potential solutions. This can provide valuable insights into the factors that contribute to the success or failure of VAR systems in different contexts and inform the development of more effective and adaptable approaches.

5.3.3. Impact on stakeholder perceptions

Investigate the impact of VAR implementation on the perceptions and attitudes of various stakeholders, including players, coaches, referees, and fans. This can help to identify potential barriers to acceptance and adoption of the VAR system, as well as inform strategies for promoting greater understanding and trust among stakeholders.

5.3.4. Technological innovations

Explore the potential of emerging technologies, such as artificial intelligence, machine learning, and computer vision, to enhance the accuracy and efficiency of the VAR system. This can help to identify new opportunities for improving decision-making, reducing human errors, and streamlining the VAR process.

5.3.5. Psychological and social factors

Examine the psychological and social factors that influence VAR decision-making, such as cognitive biases, group dynamics, and communication styles. This can provide valuable insights into the underlying mechanisms that contribute to human errors in the VAR system and inform the development of targeted interventions to address these issues.

5.3.6. Policy and governance

Investigate the role of policy and governance in shaping the implementation and effectiveness of VAR systems, including the development of rules, regulations, and guidelines, as well as the allocation of resources and support for VAR referees. This can help to identify potential areas for reform and improvement in the governance of VAR systems at both the national and international levels.

By addressing these implications for future research, scholars can contribute to a deeper understanding of the challenges and opportunities associated with VAR implementation in football, as well as inform the on-going development and improvement of the VAR system and other digital communication technologies in sports.

Conclusion

In conclusion, this study has provided a qualitative content analysis of two controversial VAR instances in the English Premier League 2022-2023 season, with a focus on the types of errors committed, the player/team affected, and the consequences of such errors. The findings have highlighted the challenges and implications of VAR implementation as a digital communication technology in football, particularly in relation to the accuracy and effectiveness of the VAR system.

The analysis revealed one main type of error committed by VAR referees: judgment errors, and the possibility of another type in technical errors. These errors have significant implications for the fairness and integrity of the competition, as well as the credibility of the league and its digital communication technologies. The consequences of VAR errors can be far-reaching, affecting not only the outcome of individual matches but also the overall standings and reputation of the teams involved.

To address these challenges, this study has provided several recommendations for improving the performance of VAR referees, including enhanced training programs, clear guidelines and protocols, collaboration and peer review, technological improvements, real-time feedback and support, transparent communication, and performance monitoring and evaluation. These recommendations can help to improve the accuracy and effectiveness of the VAR system, promote greater understanding and trust among stakeholders, and ultimately, create a more fair and enjoyable experience for all involved.

In conclusion, the importance of addressing human errors committed by VAR referees in the EPL cannot be overstated. As digital communication technologies continue to transform the world of sports, it is crucial to learn from the experiences of early adopters like the Premier League and invest in on-going research and development to enhance the accuracy and reliability of these technologies. By doing so, we can ensure that the highest standards of performance are maintained across the VAR system and other digital communication technologies in sports, and that the integrity and fairness of the competition are preserved for future generations.

References

Aarnink, A. (2021). How Does the Video Assistant Referee (VAR) Affect Players' Sabotage Behavior? *SSRN*.

BBC Sport. (2023, February 11). *Brighton had a goal incorrectly ruled out for offside because of a human error by VAR.* Retrieved February 13, 2023, from Twitter: https://twitter.com/BBCSport/status/1624533912939634688?lang=en

Benge, J. (2023, February 12). *How powerful could three points have been for Arsenal had it not been for an extremely basic human error?* Retrieved February 13, 2023, from Twitter: https://twitter.com/jamesbenge/status/1624711713164500992

Chen, R., & Davidson, N. P. (2021). English Premier League manager perceptions of video assistant referee (VAR) decisions during the 2019-2020 season. *Soccer and Society Vol. 23 Issue 1.*

Chesham, D. (2023, February 12). *Lee Mason from Greater Manchester 'forgot' to draw lines on the blatant offside yesterday.* Retrieved February 13, 2023, from Twitter: https://twitter.com/CheshamDanny/status/1624722748034494464

Critchlow, D. (2023, February 2023). *No VAR lines drawn for offside Brentford goal v Arsenal.* Retrieved from dailycannon.com: https://dailycannon.com/2023/02/arsenal-var-brentford/

Dellea, D., Vogel, S., Meletiadis, I., Gupta, N., Zahn, F., Görgülü, K., & Drechsel, D. (2014). *Football's Digital Transformation, growth opportunities for football clubs in the digital age.* London: PricewaterhouseCoopers International Limited.

Digital Mahbub. (2022, December 04). *What are the Pros and Cons of VAR? All you need to know.* Retrieved from digitalmahbub.com: https://digitalmahbub.com/pros-and-cons-of-var/

ESPN FC. (2023, February 12). *VAR Lee Mason didn't notice Christian Nørgaard coming back from an offside position for Brentford's equaliser against Arsenal.* Retrieved February 13, 2023, from Twitter: https://twitter.com/ESPNFC/status/1624769038885814273?lang=en

Football Daily. (2023, February 13). *"It's a human error brought on by that time eating away. Three minutes is an eternity to a spectator.".* Retrieved February 13, 2023, from Twitter: https://twitter.com/footballdaily/status/1625100772848373761?lang=en

Football Daily. (2023, February 13). *"This is just a human error. There's no doubt about that. It's just one you have to say sorry for.".* Retrieved February 13, 2023, from Twitter: https://twitter.com/footballdaily/status/1625105741521604608?lang=en

Gürler, C., & Volkan, P. (2021). Video Assistant Referee's Effect on Football: Turkish Super League Case. *Revista Brasileira de Educação Vol. 13 Issue 52*, 118-124.

Hamsund, T., & Scelles, N. (2021). Fans' Perceptions towards Video Assistant Referee (VAR) in the English Premier League. *Journal of Risk and Financial Management Vol. 14 Issue 12*, 573-.

Han, B., Chen, Q., Peñas, C. L., Wang, C., & Lui, T. (2020). The influence of the video assistant referee on the Chinese Super League. *International Journal of Sports Science & Coaching Vol. 15*.

Johnson, D. (2023, May 28). *How VAR decisions have affected every Premier League club in 2022-23*. Retrieved May 30, 2023, from ESPN: https://www.espn.co.uk/football/story/_/id/37631044/how-var-decisions-affected-every-premier-league-club-2022-23

Medeiros, J. (2018, June 23). *The inside story of how FIFA's controversial VAR system was born*. Retrieved May 30, 2023, from Wired: https://www.wired.co.uk/article/var-football-world-cup

Metelski, A., & Leszczynski, M. (2022). The digital transformation of football clubs based on the example of social media. *Journal of Education, Health and Sport Vol. 12 Issue 5*, 204-214.

Osman. (2023, February 12). *To say the VAR mistake is 'Human Error' is never acceptable*. Retrieved February 13, 2023, from Twitter: https://twitter.com/OsmanZtheGooner/status/1624715612684525570?lang=en

Panja, T. (2023, February 13). *VAR controversy is one of human error, just like the controversies before VAR*. Retrieved February 13, 2023, from Twitter: https://twitter.com/tariqpanja/status/1625174502941372416?lang=en

PGMOL. (2023, February 12). *PGMOL can confirm its Chief Refereeing Officer Howard Webb has contacted both Arsenal and Brighton & Hove Albion*. Retrieved February 13, 2023, from Twitter: https://twitter.com/FA_PGMOL/status/1624765372204257282?lang=en

Sahan, N., Ulukan, M., Temel, V., Ulukan, H., & Sahin, A. (2012). Determination of the communication skills of the professional football teams in Turkish super league. *Energy Education Science and Technology Part B: Social and Educational Studies Vol. 4 Issue 3*, 1433-1440.

Samuel, R. D., Galily, Y., Filho, E., & Tenenbaum, G. (2020). Implementation of the Video Assistant Referee (VAR) as a Career Change-Event: The Israeli Premier League Case Study. *Frontiers in Psychology Sec. Movement Science and Sport Psychology Vol. 11*.

Simmons, P. (2011). Competent, dependable and respectful: Football refereeing as a model for communicating fairness. *Ethical Space: The International Journal of Communication Ethics Vol. 8 Issue 3/4*, 33-42.

Sky Sports. (2023, February 12). *VAR 'did not fully investigate' disputed Brentford equaliser in 1-1 draw at Arsenal.* Retrieved February 13, 2023, from skysports.com: https://www.skysports.com/football/news/11670/12809211/var-did-not-fully-investigate-disputed-brentford-equaliser-in-1-1-draw-at-arsenal

Sky Sports Premier League. (2023, February 11). *Arsenal DROP points as Toney bags equaliser! | Arsenal 1-1 Brentford | EPL Highlights.* Retrieved from youtube.com: https://www.youtube.com/watch?v=_c8IkZc-xS8

Sky Sports Premier League. (2023, February 11). *Sanchez HOWLER gifts Eagles a point! | Crystal Palace 1-1 Brighton | EPL Highlights.* Retrieved from youtube.com: https://www.youtube.com/watch?v=hvb76Ra1tjU

South, Z. (2022). *The Usage of Video Assistant Referee (VAR) and its impact on Players' and Fans' Emotional Experience of Football.* Christchurch: University of Canterbury.

Spitz, J., Wagemans, J., Memmert, D., Williams, A. M., & Helsen, W. F. (2021). Video assistant referees (VAR): The impact of technology on decision making in association football referees. *Journal of Sport Sciences Vol. 39 Issue 2*, 147-153.

Ströbel, T., Stieler, M., & Stegmann, P. (2021). Digital transformation in sport: The disruptive potential of digitalization for sport management research. *Sport, Business & Management, Vol. 11 Issue 1*, 1-18.

Zhang, Y., Li, D., Gómez-Ruano, M.-A., Memmert, D., Li, C., & Fu, M. (2022). The effect of the video assistant referee (VAR) on referees' decisions at FIFA Women's World Cups. *Frontiers in Psychology Sec. Movement Science and Sport Psychology Vol. 13*.