

Perception of and Satisfaction with Video Assistant Refereeing in Soccer

Petronella Jonck^a, Jhalukpreya Surujlal^b, Manilall Dhurup^c, ^aFaculty of Economic and Management Sciences, North-West University, ^bFaculty of Economic and Management Sciences, North-West University, ^cFaculty of Management Sciences, Vaal University of Technology, Email: petrojonck@hotmail.com, Babs.Surujlal@nwu.ac.za, royd@vut.ac.za

The recent introduction of Video Assistant Referee (VAR) in soccer yielded mixed responses from soccer enthusiasts. This study primarily aimed at determining how much variance in satisfaction with VAR could be explained by the perceptions thereof. The secondary aim was to determine the effect of selected demographic variables on perception and satisfaction with VAR in a South African sample. A cross-sectional quantitative survey entailing a non-probability sample consisting of 140 (n = 140) respondents was used to measure perception and satisfaction with VAR at soccer matches. Inferential statistical analyses were performed viz. multiple regression analysis, independent sample t-tests and MANOVA to analyse the dataset. Results indicated that perception of VAR statistically significantly predicted satisfaction with the stated. It was determined that 22.2% of the variance in satisfaction with Video Assistant Refereeing could be attributed to the perception thereof. Additionally, as perception increased there was a concurrent increase in satisfaction with VAR. Results relating to the demographic variables and the impact thereof on perception of and satisfaction with VAR yielded mixed results. The application of VAR, in conclusion, has to be improved considerably for it to placate soccer enthusiasts as evident from the results presented.

Key words: *Video Assistant Refereeing, Technologies, Spectatorship, Perception of VAR, and Satisfaction with VAR.*

Introduction

Globally, technology has permeated every fibre of society with sports being no exception. Bacigalupe (2019) noted that, in accordance with current trends, sports in general have introduced up-to-date technology to reach the highest standard of decision-making by referees. From the onset however, there were those in favour of and against the introduction of technologies (Bacigalupe, 2019). Indeed, sport spectatorship has evolved over the past decades. In recent times, the use of visualisation and measurement technology is increasingly playing an instrumental role in sport spectators' and fans' experience of sport as well as their scrutiny and response to match officials' decision-making (Collins & Evans, 2011). This has led to sports' governing bodies introducing innovative technologies as well as additional experts in order to preserve the legitimacy of decision-making (Collins & Evans, 2011).

Officiating in the majority of sports has always attracted controversies. In most instances, the umpire or referee is on the receiving end from either fans, supporters, players or coaches. Among the officials that have been receiving increased research attention recently is soccer referees. Wolfson and Neave (2007) commented that soccer referees experience continuous unrestrained negative feedback throughout and after a match resulting in high levels of stress. Andrews (2018) argued that the tradition of blaming the referee, used by both players and coaches to save face after team loses or poor performances, might soon be a thing of the past with the introduction of video assistant referee (VAR) to assist officiating referees to arrive at an impartial, accurate and more objective decision. VAR comprises a team of three individuals working in unison to review certain decisions made by the on-field referee by means of watching video replays of the relevant incidents. The team is made up of the video assistant referee (i.e. a current or former referee), his/her assistant and a replay operator. The VAR team is situated in a video operation room which is essentially a bank of monitors offering different camera angles of an incident (Ugondo & Tsokwa, 2019).

Over a two-year period, VAR has been tested extensively in at least 14 countries in hundreds of matches using thousands of officials and capturing tens of thousands of incidents from several camera angles (MacInnes, 2018). The first trial took place in the United Soccer League in the United States during a match between two reserve teams, namely the New York Red Bulls II and Orlando City B, in August of 2016 (Platt, 2018). While, the Chinese Super League introduced the same in the 2018 season (Han, Chen, Peñas, Wang & Liu, 2020). In the English Premier League (EPL) it has been trialled in a non-live environment without any contact with the match officials during the meet. McMahon (2017) argued that the introduction of VAR in various leagues and competitions around the world had not gone as well as predicted by long-standing proponents of the technology. Instead of a seamless process which pledged a few seconds for a video official to review a referee's decision without impacting on the flow of the game, experimental trials proved otherwise. For example, Han et al. (2020) found in a study comparing 240 matches that VAR statistically significantly increased playing time. In similar

vein, Platt (2018) commented that instead of eliminating debate around refereeing decisions the new system resulted in more discussion and controversy over officiating than expected.

Prior to the Covid-19 pandemic which brought the English Premier League to a premature halt, the major talking point was the mixed reactions vis-à-vis controversial decisions made using VAR. Contrary to the belief that VAR would bring an end to discourse surrounding refereeing decisions, the debate has moved from refereeing decisions to decisions made using VAR, despite empirical evidence suggesting that the introduction of VAR statistically significantly decreased the number of offside and fouls (Han et al., 2020). Ryan (2019) opined that instead of restoring trust in officiating, supporters have only grown suspicious of what officials want to see. Panja (2019) commented that VAR has negative influences, *inter alia*, pausing the game, inducing controversy, and aggravating fans through numerous replays. Bakos (2019) argued that VAR's usage undermines the role and trust placed in referees, and increases internalised stress and anxiety levels. As such, Panja (2019) noted that influential role-players conceded that there were on-field penalty decisions based on VAR that officials overturned that had in actual fact been correct. Similarly, a popular television commentator and former England national team captain, who has always been critical of VAR, recently expressed dissatisfaction. In a similar vein, a featured pundit on Sky Sports and former Liverpool defender, retracted initial support of VAR stating that he might have been erroneous in calling for the introduction of video replays and would not argue for it any more (Ryan, 2019). While, a recent survey conducted by an independent British consulting firm revealed that more than two-thirds of spectators questioned believed VAR has made the game less enjoyable since it was introduced in the English top flight. Major complaints identified by stakeholders related to the manner in which VAR was utilised, and subsumed lengthy review delays and dubious decisions causing widespread frustration (Agence France-presse, 2020).

In light of the aforementioned, limited empirical evidence could be identified that investigated the perception of and satisfaction with VAR scientifically especially in the South African context. Taking into account afore stated, the study under discussion sought primarily to determine how much variance in satisfaction with VAR could be explained by the perception thereof. In addition, the effect of selected demographic variables on perception and satisfaction with VAR was investigated.

Literature review

After a unanimous vote by football clubs, VAR was introduced in the EPL for the first time during the 2019-2020 season amid much debate about the impact thereof on the game. One of the deciding factors supporting the introduction of VAR in the EPL was the fact that it proved to be 99.2 percent accurate in the 440 times it was used in the 2018 FIFA World Cup (IANS, 2018). Smith (2020) argued that despite technology being brought in to reduce controversial decisions, its introduction has arguably caused more complications than it has solved. Since the introduction of VAR to the EPL, hardly a week has passed without a VAR-induced

controversy (Panja, 2019). Shared complaints raised by players and coaches subsume time taken to review decisions and the confusion caused as well as bringing halt to play. Commenting on the use of VAR in Germany, Honigstein (2018) remarked that poor application, delays and technical problems led to approximately 47 percent of players wanting VAR to be abolished.

Currently VAR is used in four scenarios, namely goals (and violations in the build-up to awarding a goal), penalties, red cards and mistaken identity in awarding a card. Furthermore, for a refereeing decision to be overturned, there must be a distinct error (Platt, 2018). Mistaken identity is the easiest of the four categories to make a decision on. There is no element of subjectivity that can influence the decision. In relation to goals, the role of the VAR is to assist the referee in identifying whether an infringement led to a goal being scored and whether the goal should be awarded. Although play is interrupted, there is no real impact on the game as the delay would at any rate have occurred if it was a legitimate goal, as the scoring team would use up time celebrating the goal. Regarding penalty decisions, VAR is used to ensure that no clearly incorrect decisions are made in the awarding or non-awarding of a penalty kick. Offside decisions using VAR are also highly accurate. An element of partiality enters the decision-making when a call has to be made whether a foul was intentional or whether a player who is in an offside position has interfered with play when a goal is scored. In both the aforementioned situations a goal or penalty can be awarded or not awarded. Such instances will continue to attract debate thereby questioning the effectiveness of VAR. VAR also assists in ensuring that no clearly wrong decisions are made regarding sending off or not sending off a player. If the referee is unsure which player should be cautioned or sent off, the VAR will inform the referee so that the correct player can be sanctioned. Reviewing a decision can occur in two ways, namely on the request of the referee or a recommendation from the VAR team. The VAR team may draw the attention of a referee to any potential error upon which the referee has three options: overturn the original decision based on the advice of the VAR team, stick to the original decision or review the 'error' on a monitor on the touchline before making a decision (Spitz, Wagemans, Memmert, Williams & Helsen, 2020).

Whereas MacInnes (2018) argued that the use of VAR is not about altering the manner in which the game is played, but should only be used when a clear mistake has been made. Contrary views perceive the utilisation of technology as unnecessary interference (Bacigalupe, 2019). Wilson (2018) described VAR as a solution looking for a problem. The author opines that VAR is putting the spectator paying an exorbitant price for a ticket to get first-hand match experience at a disadvantage, when left oblivious compared to those spectators watching the match on television when decisions are made using VAR. This has, however not gone unnoticed. The Professional Game Match Officials Limited (PGMOL) group which was formed to improve refereeing standards, committed to improvements in the use of VAR. Among the suggested improvements include making more information available via VAR graphics to attending spectators as well as viewers globally by providing more specific details, e.g. checking penalty

– possible handball instead of checking penalty (PremierLeague.com., 2019). Another area of improvement identified, *inter alia*, speed and consistency of decision-making will be prioritised. Foretasted will improve as officials become more experienced with the technology and protocols.

Despite a paucity of empirical evidence underscoring the usage of VAR, Lago-Peñas, Rey and Kalén (2019) put forward that implementation of VAR reduced the number of goals, fouls and yellow cards in Italy's Series A. Han et al. (2020) partially confirmed similar results in the Chinese Super League. More specifically, VAR statistically significantly reduced the number of offside pronouncements and fouls while decreasing the home team advantage slightly. Errekagorri, Castellano, Echeazarra and Lago-Peñas (2020) concluded that the findings suggest VAR marginally alters the game of elite soccer. Specifically, research indicated a slight increase in playing time as well as physical performance with a concomitant increase in the number of goals. To date, research could not be identified emphasising the perception of spectators.

Research methodology

To test the primary and secondary research hypotheses, a quantitative research methodology was utilised and expounded on sequentially. The research hypotheses stated that:

- H₁: Variance in Video Assistant Refereeing satisfaction can be statistically significantly attributed to the perception thereof.
- H₂: Demographic variables i.e. gender, age, academic qualification and soccer preference statistically significantly influence perception and satisfaction with Video Assistant Refereeing.

Research design

The research presented employed a quantitative, descriptive, cross-sectional design to collect data from a non-probability convenience sample utilising a self-constructed questionnaire. The research design could be considered as cross-sectional ascribed to data gathering being implemented at a singular point in time in the absence of repeat application (Van der Walt, Mpholo & Jonck, 2016). The research design was descriptive as the intention was to describe a phenomenon as appropriately feasible in a specific population (Salkind, 2012). Moreover, Horn (2009) opine, that quantitative research collects numerical data and relies most often on deductive reasoning. In terms of the stated research hypotheses, the preceding design was deemed appropriate to statistically significantly ascertain whether the variance in Video Assistant Refereeing satisfaction could be attributed to the perception thereof.

Research participants

The population for the present study comprises of soccer enthusiasts in the Gauteng province of South Africa. Ascribed to the size of the population a non-probability convenience sample was drawn. One hundred and forty (n = 140) respondents constituted the final sample (see Table 1). Of these, the majority (n = 102; 72.9%) were male and the remainder female (n = 38; 27.1%). In terms of the age distribution, the majority of the sample were between the ages of 18 and 25 years (n = 62; 44.3%), followed by respondents between the age of 42 and 49 years (n = 29; 20.7%), those between 26 and 33 years (n = 27; 19.3%), and respondents between 34 and 41 years as well as 50 years and older both age groupings representing 7.9% (n = 11) of the sample. When considering academic qualification, 55.7% (n = 78) of the sample held a university qualification, followed by respondents with a college diploma (n = 27; 19.3%), matric or Grade 12 (n = 26; 18.6%), and secondary school (n = 2; 1.4%). However, 7 respondents representing 5% of the sample indicated their academic qualification could not be classified in the given categories. Lastly, with reference to preference, the overwhelming majority indicated they preferred watching soccer on the television (n = 101; 72.7%), while 27.3% (n = 35) preferred watching at the stadium.

Table 1: Demographic profile of the sample

Variable	Level of the variable	N	Valid Percent	Cumulative Percent
Gender	Male	102	72.9	72.9
	Female	38	27.1	100.0
Age	18-25 years	62	44.3	44.3
	26-33 years	27	19.3	63.6
	34-41 years	11	7.9	71.4
	42-49 years	29	20.7	92.1
	50 years and older	11	7.9	100.0
Academic qualification	Secondary school	2	1.4	1.4
	Matric / Grade 12	26	18.6	20.0
	College	27	19.3	39.3
	University	78	55.7	95.0
	Other	7	5.0	100.0
Soccer preference	Watching on TV	101	72.7	72.7
	Watching at stadium	38	27.3	100.0

Measuring instrument

The measuring instrument comprised a biographical section and a section ascertaining perception and satisfaction with Video Assistant Refereeing. The first mentioned section

included four questions related to the respondents' gender, age, highest academic qualification and soccer preference. Section B contained 66 questions that probed respondents' perception of and satisfaction with Video Assistant Refereeing. Typical questions relating to perception of Video Assistant Refereeing included, for example, '*The use of Video Assistant Refereeing will result in fewer professional fouls.*' Another example, '*Utilisation of Video Assistant Refereeing will result in players exercising greater care in their actions.*' Typical items probing satisfaction with Video Assistant Refereeing included, '*Overall I am satisfied that Video Assistant Refereeing has been introduced in soccer.*' Another example subsume, '*I am generally satisfied that the use of Video Assistant Refereeing has resulted in better matches.*' Respondents were requested to select the most appropriate option from a five-point Likert scale, with options ranging from 'Strongly disagree' (1) to 'Strongly agree' (5).

Cronbach's Alpha reliability coefficient performed on the measuring instrument has confirmed the reliability thereof. More specifically, Cronbach's alpha values for each sub-scale and the total scale were as follows: perception of VAR sub-scale (0.867), satisfaction with VAR sub-scale (0.918) and total scale (0.877). Factor analysis was conducted to determine the underlying construct validity of the questionnaire (Lu, 2014). Results indicated that the data were factorable, as the Kaiser-Meyer-Olkin (KMO) test for sampling adequacy returned a value of 0.60, and Bartlett's test for sphericity reverted a statistically significant value on the 99th percentile ($\chi^2 = 6841.564$; $df = 2145$; $p = 0.000^{**}$). An exploratory factor analysis with oblique (oblimin) rotation was computed, and it was ascertained that eighteen components had an eigenvalue exceeding 1, accounting for 75.19% of the total variance. Nevertheless, inspection of the results and scree plot indicated a clear break after the second factor. Hence, two components were retained for the purpose of further investigation. Confirmatory factor analysis was performed with a forced two-factor rotation.

Pursuant to the confirmatory factor analysis two underlying dimensions were identified which accounted for 28.56% of the total variance. Factor one, which emphasised satisfaction with Video Assistant Refereeing included items such as the usage of Video Assistant Refereeing and the resultant good matches (factor loading = 0.659), satisfaction with the introduction of Video Assistant Refereeing (factor loading = 0.655) and satisfaction with decisions made by referees via Video Assistant Refereeing (factor loading = 0.638). Factor two focused on perception regarding Video Assistant Refereeing and included items to this effect, for example the utilisation of Video Assistant Refereeing will reduce the flow of matches (factor loading = 0.728), slow the game (factor loading = 0.675), create more interruptions (factor loading = 0.654) and result in an over-reliance by referees on Video Assistant Refereeing (factor loading = 0.590).

Statistical analysis

Using SPSS (Statistical Package for Social Sciences) version 26, descriptive and inferential analyses were performed. Descriptive analysis was conducted to provide a profile of the

sample. Additionally, measures of central tendency were determined to reflect the status quo. Inferentially, the primary research hypothesis was tested by means of multiple regression analysis. The secondary research hypothesis was investigated through multivariate analysis of variance (MANOVA) and independent sample t-tests. With specific reference to the psychometric properties of the questionnaire, Cronbach's Alpha coefficient and dimensional analyses were computed on scale items.

Ethical considerations

Due consideration was given to standard ethical protocol such as informed consent, confidentiality, anonymity and voluntary participation. Moreover, ethical clearance was obtained from the ethics committee of the higher education institution under whose auspices the research was conducted (ethics clearance number FRECMS-18032020-027)

Limitations

An acknowledged caveat that should be taken into consideration when interpreting results is the sample size. Per se, results are based on a sample which cannot be deemed representative of the population. Hence, results are not generalisable to the population and only identify trends.

Results

The primary aim of the study was to ascertain whether perception of Video Assistant Refereeing statistically significantly explain the variance in satisfaction therewith. Secondly, it was to determine whether demographic variables statistically significantly influence perception of and satisfaction with Video Assistant Refereeing. To achieve the stated aims, the measures of central tendency were calculated and depicted in Table 2 below.

Table 2: Measures of central tendency for the variables measured

Variable	Min	Max	Median	Mean	SD	Skewness	Kurtosis
Perception of VAR	175	280	221	220,41	20,643	-0.165	-0.410
Satisfaction with VAR	5	25	20	18,97	4,520	-1.059	1.322

SD; standard deviation

As evident from Table 2, respondents reported a slightly negative perception of (mean = 220.41; SD = 20.643) as well as satisfaction with (mean = 18.97; SD = 4.520) VAR. Moreover,

the distribution seems to be slightly skewed to the left as indicated by the skewness and kurtosis measures.

In order to test the primary research hypothesis which essentially seeks to investigate how much of the variance in satisfaction with Video Assistant Refereeing could be explained by the perception thereof, a multiple regression analysis was performed. The results of this analysis are indicated in Table 3.

Table 3: Multiple regression analysis results with satisfaction with Video Assistant Refereeing as dependent variable and perception of Video Assistant Refereeing as independent variable

Variable	Satisfaction with Video Assistant Refereeing							
	R	R ²	F	β	t	p	Tolerance	VIF
Perception of VAR	0.222	0.049	7.150	0.222	2.674	0.008**	1.00	1.00

R, R-value; R², R-squared value; F, F-value; B, Beta-value; p, significance; VIF, Variance Inflation Factor.

** $p \leq 0.01$

According to Table 3, perception of Video Assistant Refereeing statistically significantly predict satisfaction with the aforementioned on the 99th percentile. It was found that 22.2% ($\beta = 0.222$) of the variance in satisfaction with Video Assistant Refereeing could be attributed to the perception thereof. The yielded results were positive thus as perception of Video Assistant Refereeing increased concomitantly with satisfaction with the said increased.

Sequentially, to test the secondary research hypothesis Independent Sample T-tests were performed for variables with two response categories (i.e. gender and soccer preference) and illustrated in Table 4, while Multivariate Analysis of Variance also referred to as MANOVA were calculated for age and academic qualification (see Table 5). Note that the Levene's test for significance did not yielded statistically significant results with reference to the Independent Sample T-tests indicative of equal variance assumed.

Table 4: T-test results for selected variables with perception of and satisfaction with Video Assistant Refereeing

Independent variable	Dependent Variable	Mean difference	t	DF	p
Gender	Perception of VAR	9.914	2.578	138	0.011*
	Satisfaction with VAR	-0.906	-1.055	138	0.293
Soccer preference	Perception of VAR	5.550	1.423	137	0.157
	Satisfaction with VAR	-1.551	-1.811	137	0.072

* $p \leq 0.05$; t, t-value; DF, degrees of freedom

Results presented in Table 4 indicated that, gender statistically significantly influenced the perception of Video Assistant Refereeing on the 95th percentile. More specifically, male respondents held a positive perception of Video Assistant Refereeing (mean = 223.10; SD = 20.162), opposingly female respondents held a negative perception of Video Assistant Refereeing (mean = 213.18; SD = 20.438). Soccer preference did not yield a statistically significant result.

Table 5: MANOVA test results for various demographic variables and perception of and satisfaction with Video Assistant Refereeing

Independent variable	Dependent variable	Mean squares	f	DF	p
Age	Perception of VAR	717.062	1.717	4	0.150
	Satisfaction with VAR	18.851	0.921	4	0.454
Academic qualification	Perception of VAR	1,094.057	2.692	4	0.034*
	Satisfaction with VAR	39.543	1.991	4	0.099

* $p \leq 0.05$; *f*, *f*-value; *DF*, degrees of freedom

As can be seen from Table 5, academic qualification statistically significantly influenced perception of Video Assistant Refereeing on the 95th percentile. More specifically, only respondents with a college diploma held a positive perception of Video Assistant Refereeing (mean = 228.59; SD = 17.805). Respondents with secondary schooling had the most negative perception (mean = 190.000; SD = 0.000), followed by respondents with a Grade 12 diploma (mean = 215.58; SD = 16.836), those respondents who could not be categorised in the given categories (mean = 216.43; SD = 21.555), and lastly respondents in possession of a University qualification (mean = 220.32; SD = 21.844). Age did not yield a statistically significant result.

Discussion of results

The primary research hypothesis stated that the variance in Video Assistant Refereeing satisfaction can be statistically significantly attributed to the perception thereof. Results revealed that 22.2% of the variance in satisfaction with Video Assistant Refereeing could be attributed to the perception thereof. Hence, the primary research hypothesis was accepted. To date limited empirical studies could be identified which investigated soccer enthusiasts' satisfaction with VAR especially in the South African context. While there is both anecdotal as well as confirmation from several opinion polls that soccer enthusiasts were positive about the introduction of VAR, recent opinion poll revealed that the attitude of players, fans and managers have changed. Evident from the findings of this study is that respondents' perception of VAR leaned very slightly towards negative. This provides little evidence whether soccer enthusiasts have fully 'acclimatized' to VAR. However, findings from a sentimental analysis study (Karthick, 2019) corroborate the findings of the current study. The study conducted by

Karthick (2019) revealed that EPL fans have an overall negative sentiment about how VAR is being implemented. More recently an independent conducted perception poll revealed that over two thirds of Premier League fans are of the view VAR is making watching football 'less enjoyable' (Sidle, 2020). It is therefore understandable that in the case of the research under discussion that the negative perception of VAR led to dissatisfaction with VAR.

The second research hypothesis sought to investigate whether demographic variables i.e. gender, age, academic qualification and soccer preference statistically significantly influence perception and satisfaction with Video Assistant Refereeing. Results indicated that gender and academic qualification statistically significantly influenced perception of Video Assistant Refereeing. With reference to the first mentioned a novel finding of this study was the difference in perception of VAR between male and female soccer enthusiasts. Male respondents' perception of VAR was positive in comparison to female respondents' perception which was negative. To date no evidence could be found in literature on gender differences with reference to the perception of VAR. Interesting to note is that respondents with a formal qualification (college diploma) viewed the use of VAR positively. This finding is supported by evidence from other studies (e.g. Naicker & Van Der Merwe, 2018; Aldosari, Al Shunaifi, Ullah et al., 2019) which alluded to the fact that individuals with higher levels of education have a greater knowledge, and awareness of the value and potential of technology. Based on the results presented the secondary research hypothesis was partially accepted.

Conclusion

The utilisation of technology in sport to improve decision making and reduce human error on the pitch in order to achieve more objective outcomes is set to remain. The current study attempted to ascertain the perceptions of soccer enthusiasts of VAR and the subsequent satisfaction with the application thereof in a South African sample. It can be concluded from the results that the application of VAR has to be improved considerably for it to placate soccer enthusiasts, especially as the interpretation and application of the rules around VAR may differ from official to official. In light of the paucity of studies investigating the said with any degree of rigor, future research endeavours could focus on escalating the study nationally in order to verify the results presented.



REFERENCES

- Agence France-press, (2020). EPL boss says VAR to stay but will be refined. Retrieved from: <https://www.straitstimes.com/sport/football/epl-boss-says-var-to-stay-but-will-be-refined>. [Accessed on 14 May 2020].
- Aldosari, F., Al Shunaifi, M.S., Ullah, M.A., Muddassir, M. & Noor, M.A. (2019). Farmers' perceptions regarding the use of information and communication technology (ICT) in Khyber Pakhtunkhwa- Northern Pakistan. *Journal of the Saudi Society of Agricultural Sciences*, 18, 211-217.
- Andrews, C. (2018). Who needs glasses now? Retrieved from: <https://ieeexplore.ieee.org/document/8720921>. [Accessed on 11 May 2020].
- Bacigalupe, C. (2019). The video assistant referee (VAR) protocol. In Amenteros, M., Benitez, A.J., & Betancor, M.A. (Eds.). *The use of video technologies in refereeing football and other sport*, pp. 183-207. New York, USA: Routledge.
- Bakos, A. (2019). VAR in Sports: Is the Human Referee a Thing of the Past? Retrieved from: <https://journeys.dartmouth.edu/alexanderebakos22/2019/03/08/var-in-sports-is-the-human-referee-a-thing-of-the-past/>. [Accessed on 28 April 2020].
- Chakravorty, M. & Chakravorty, S.K. (2011). Role of Technology in Sports. Paper presented at the 11th Annual International Conference on Sports: Economic, Management, Marketing & Social Aspects, 11-14 July, 2011, Athens, Greece.
- Collins, H. & Evans, R. (2011). Sport-decision aids and the “CSI-effect”: Why cricket uses Hawk-Eye well and tennis uses it badly. *Public Understanding of Science*, 21(8), 904-921.
- Errekagorri, I., Castellano, J., Echezarra, I., & Lago-Peñas, C. (2020). The effects of the Video Assistant Referee system (VAR) on the playing time, technical-tactical and physical performance in elite soccer. *International Journal of Performance Analysis in Sport*. DOI: 10.1080/24748668.2020.1788350
- Guvener, A. (2017). The future of VAR. Retrieved from <https://www.socceramerica.com/publications/article/75533/the-future-of-var.html>. [Accessed on 10 March 2020].
- Han, B., Chen, Q., Peñas, C.L., Wang, C., & Liu, T. (2020). The influence of the video assistant referee on the Chinese Super League. *International Journal of Sports Science and Coaching*, 15(5-6), 662-668.



- Honigstein, R. (2018). Forty-seven per cent of Bundesliga players say VAR should be abolished. Retrieved from: <https://mobile.twitter.com/honigstein/status/950413378589265920>. [Accessed on 13 May 2020].
- Horn, R. (2009). *Researching and writing dissertations: A complete guide for business students*. London, United Kingdom: Chartered Institute of Personnel and Development (CIPD).
- IANS, (2018). FIFA: VAR used 440 times, increased referee accuracy, ended off-side goals. Retrieved from: https://www.business-standard.com/article/news-ians/fifa-var-used-440-times-increased-referee-accuracy-ended-off-side-goals-118071301058_1.html. [Accessed on 5 May 2020].
- Karthick, M.P. (2019). How frustrated are Premier League fans with VAR? A look at their reactions using Sentiment Analysis in R. Retrieved from: <https://towardsdatascience.com/how-frustrated-are-premier-league-fans-with-var-c8ae9c227418>. [Accessed on 12 May 2020].
- Lagos-Peñas, C., Rey, E., & Kalén, A. (2019). How does Video Assistant Referee (VAR) modify the game in elite soccer? *International Journal of Performance Analysis in Sport*, 19(4), 646-653. DOI:10.1080/24748668.2019.1646521.
- Lu, C.H. (2014). Assessing construct validity: The utility of factor analysis. *Statistical Year Book*, 15, 79–94.
- MacInnes, P. (2018). Debate rages but VAR's reckoning nears as football prepares for revolution. Retrieved from: <https://www.theguardian.com/football/2018/jan/17/var-football-revolution-technology>. [Accessed on 10 March 2020].
- McMahon, B. (2017). The case for and against using video assistant referee technology at the FIFA 2018 World Cup finals. Retrieved from: <https://www.forbes.com/sites/bobbymcmahon/2017/11/09/the-case-for-and-against-using-video-assistant-referee-technology-at-the-fifa-2018-world-cup-finals/#485552847278>. [Accessed on 21 February 2020].
- Naicker, V., & Van Der Merwe, D.B. (2018). Managers' perception of mobile technology adoption in the Life Insurance industry. *Information Technology & People*, 31(2), 507-526.



- Panja, T. (2019). V.A.R. Check: In Premier League, Almost No One Is Happy. Retrieved from: <https://www.nytimes.com/2019/11/23/sports/premier-league-var-mike-riley.html>. [Accessed on 7 May 2020].
- Platt, O. (2018). What is VAR? The video assistant referee system's World Cup & Premier League future. Retrieved from: <http://www.goal.com/en-za/news/what-is-var-the-video-assistant-referee-systems-world-cup/19m696jq7onm618n3v9oqs02ab>. [Accessed on 21 February 2018].
- PremierLeague.com (2019). Implementation of VAR discussed at Shareholders' meeting where League and PGMOL commit to improvements. Retrieved from: <https://www.premierleague.com/news/1494932>. [Accessed on 4 May 2020].
- Ryan, L. (2019). We were all wrong about VAR but it'll be grand. Retrieved from: <https://www.irishexaminer.com/breakingnews/sport/columnists/larry-ryan/we-were-all-wrong-about-var-but-itll-be-grand-962764.html>. [Accessed on 6 May 2020].
- Salkind, J.N. (2012). *Exploring research* (8th Ed.). Boston, United States of America: Pearson Education.
- Sidle, R. (2020). Sixty-seven percent of fans say VAR makes football less enjoyable to watch. Retrieved from: <https://www.sportbible.com/football/fails-67-of-fans-say-var-makes-football-less-enjoyable-to-watch-20200204>. [Accessed on 13 May 2020].
- Smith, J. (2020) VAR is here to stay – so how does football fix it? Retrieved from: <https://www.goal.com/en-za/news/var-here-to-stay-football-fix/owfv1rotxz3d1lls5p1yyltam>. [Accessed on 6 May 2020].
- Spitz , J., Wagemans, J., Memmert, D., Williams, M. & Helsen, W.F. (2020): Video assistant referees (VAR): The impact of technology on decision making in association football referees, *Journal of Sports Sciences*, 16(38), doi:10.1080/02640414.2020.1809163.
- Van der Walt, F., Mpholo, T.S. & Jonck, P. (2016). Perceived religious discrimination as predictor of work engagement, with specific reference to the Rastafari religion. *Verbum et Ecclesia*, 37(1), a1524. <http://dx.doi.org/10.4102/ve.v37i1.1524>
- Wilson, P. (2018). VAR is another slap in the face for the long-suffering paying spectator. Retrieved from: <https://www.theguardian.com/football/blog/2018/mar/04/var-slap-in-face-paying-spectator-referees>. [Accessed on 10 March 2020].



Wolfson, S., & Neave, N. (2007). Coping under pressure: cognitive strategies for maintaining confidence among soccer referees. *Journal of Sport Behaviour*, 30, 232-247.

Ugondo, P.I., & Tsokwa, M. (2019). Interpreting Video Assistant Referee and Goal-line technology communication: the pitch-based referees perspectives. *International Journal of Trend in Scientific Research and Development*, 3(4), 1058-1062.