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Research Topic

“How did the introduction of the Video Assistant Referee (VAR) modify the game and how could the new challenge concept be implemented in the Serie A league?”

Bachelor Thesis

Geneva Business School

Bachelor in Sports Management

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Date: 22.05.2020

Declaration of Authorship

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Name: Claudio Orelli

Signature:

A handwritten signature in black ink, appearing to read 'Claudio Orelli'. The signature is stylized with a large, sweeping initial 'C' and 'O'.

Acknowledgements

In the acknowledgement of my Bachelor Thesis, "I want to thank all those who helped me in the realization of it, with suggestions, criticisms and observations: my gratitude goes to them."

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All the people mentioned on this page played a fundamental role in writing the thesis, but I want to clarify that any mistake or inaccuracy is attributable only to me".

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Abstract

The first purpose of this thesis was to analyze how the introduction of the Video Assistant Referee (VAR) statistically affected the game in the top Italian football division. The sample I personally compiled consists of a review of all 1520 games played in the Serie A during four different seasons (from 2015/16 to 2018/2019, both included). Since the VAR system was introduced in Italy starting from the 2017/2018 season, the analysis aims to examine the two seasons before and after the technology implementation into the league. The following variables were registered for every game: Fouls, Offsides, Goals, Penalties, Red Cards and Yellow cards, while further research enabled collecting quantitative variables such as Effective Playing time and Injury time. Overall, there was a decline in the number of fouls and yellow cards after the first season (2017/18). However, the numbers grew significantly concerning the following season (2018/19). In this matter, no remarkable change has been proved. The most significant aspect is related to constant a decline in the number of Offsides awarded. Both effective playing time and Injury time variables have increased. Regardless of the games becoming longer, the VAR did not significantly affect the effective playing time, as the actual time went up by only 43 seconds compared to previous season 2016/17. A further investigation was carried out, with the objective to understand referee bias and favoritism in elite football, a factor that highlights the importance of the technology aids to help improve the quality of referee decision-making. On the other side, the second purpose of the current study was to use qualitative methods to scrutinize the reasons that have elevated the new VAR system, or so called "challenge". A concept born due to the multiple controversies arose after the VAR implementation after its very first year. Based on the investigations and findings of the qualitative research, discrepancies resident in the VAR protocol were identified. These results might be useful in particular to internal football stakeholders, such as players and football managers to boost the comprehension of the consequences of the video assistant referee on elite football, as well as they help recognize referee decision behaviours. Last but not least, strategies might be developed with the purpose to enhance refereeing efficiency during football games.

Chapter 1: Introduction

A statistics-based study of the world's most popular sports conducted by "Biggest Global Sports" (2020), website which focuses on collecting data from the most reliable sources on a daily basis, shows that football is by far the leader on the list, with approximately four billion fans around the world. Based on this aspect, it is easy to claim that millions of kids' dream is to become a professional football player in future. The fact that football is so popular nowadays is also due to new technologies that not only have revolutionized the society in which we live, but have also contributed to the evolution of this amazing sport (FIFA, 2018). New technologies have forced their way into our homes and our lives, radically changing our daily living standards. No exception is made for sport, which has been totally renewed over the last decade. For example social networks were only one the first technology tools that literally opened new scenarios about sports communication, which has become public domain. In no uncertain terms, when you mention "sport" in Italy it is impossible not to think of football at first sight. The *Bel Paese* is historically a football country: social networks have done nothing but ride the wave. The technological development that this industry has seen in recent years is to say the least incredible.

Football has started to adopt and embrace new technological tools with the aim to improve the precision of the football match and decisions. For example when the International Football Association Board (IFAB) and later Fédération Internationale de Football Association (FIFA) gave the green light in 2012 to authorize the adoption of technology in football, specifically in the case of the famous "goal or not goal" question, introducing two innovative approaches with the intent to eliminate the doubt whether or not the ball has entered the goal. The first is called "Hawk-Eye" and consists of seven cameras placed in the goal using the triangulation system to determine whether or not the football crosses the goal line; in this case an encrypted radio signal is sent to a device on the referee's wrist that will be able to validate the goal in less than a second. While the second instrument is called "Goal Ref" and consists of the famous microchip located inside the football, in the event it crosses the line situated in the goal, interacts with a magnetic field, activating the detection in less than a second (HAWK-EYE Innovations, 2012). FIFA decision about implementing the Goal-Line Technology, was finally taken after an endless number of ghost goal episodes that had created a sea of controversy.

In more recent years, the Swiss-Italian president of FIFA, Giovanni Infantino, after some experiments, announced the official introduction of an innovative technology on the occasion of the 2018 World Cup in Russia, the so-called VAR, which stands for Video Assistant Referee. A technology destined to revolutionize the game in elite football. This device is a referee support system through the use of technological tools (TV, in simple words) under the supervision of two assistants. The use of the VAR was approved by the IFAB in June 2016 and according to the latter its goal is not to correct the small details but the big mistakes. However, proposing such a

revolutionary change, in a sport like football, is not simple and very often, controversies may arise (Sandvoss, 2004).

This thesis focuses on identifying how the implementation of the VAR affected and modified a very specific and niche market, as for example the top division of the Italian Football, the Serie A (also called Serie A TIM due to sponsorship by TIM). The article proceeds as follows. In the next section, the VAR background, the favouritism and referee bias in professional football, and the stakeholders' perception over the VAR are evaluated and reviewed within the literature review, constituting a comprehensive summary of previous research regarding the topics in question. This latter section offers the necessary guarantee of objectivity with respect to traditional methodologies, as it is based on the rigorous analysis of the evidence that arises from the careful evaluation of the available, published documents on the chosen topic, according to reliable and quality criteria. It also includes the most relevant works by specific topics published in reliable journals. Furthermore, academic sources are exhibited, with the intent to provide the interpretation of Existing literature in the light of Updated developments in the field, to update the reader on the state of the art of research in the specific area and to present that knowledge in the form of a written report. If it's not written, it's not research (Evans & Gruba, 2006).

In the first part of this research, the methodology consists of explaining how the VAR is working in modern days, analyzing its theoretical aspects as well as fundamental principles. Theories are useful because they are used to understand and to set up research. But without experimental tests, only hypotheses remain. Therefore, the study I further compiled proceeds with a statistical analysis regarding the effect that the VAR has caused. The data collected was retrieved from the combination of 1520 matches among the four years of activity, before and since its application to the Serie A. The following variables are used for the purpose: Goals, Penalty Kicks, Red and Yellow Cards Fouls and Offsides. The next section, the findings and results of the sample are presented, followed by the part where the most striking and shocking cases where the VAR had failed in the Serie A are also examined, by particularly highlighting the criticism among people stakeholders.

The following part of the article focuses on investigating a new proposal that the FIGC, governing body of football in Italy also known as Federcalcio, have already appealed to IFAB, confirming its determination to innovate the technology in the game, by strengthening the use of the VAR. This new proposal would allow players and/or coaches to request a VAR review, basically a concept similar to tennis or basket; here is where the name "challenge" comes from. In other words, the new methodology consists of implementing a challenge that empowers the teams to call a VAR review in case episodes were deemed, judged superfluous or contestable. After having analyzed pros and cons about its hypothetically implementation into the Italian League, opinions and thoughts concerning the new VAR challenge are then collected by combining online research and individual statements expressed by members that constitute the Italian industry.

Last but not least, the final section includes a conclusion, which consists of a summary of the results with an interpretation of the research questions, the limitations and the recommendations. This last section is essential on account of it shows a general outcome of the study and it adds further suggestions.

Chapter 2: Literature Review

Brainstorming the VAR concept

While FIFA was still in the testing and experimental phase, Serie A independently introduced this new system. Nevertheless, the VAR was firstly introduced in top European leagues by Bundesliga (the top German football division) and just by the Italian League at the start of the 2017/18 season. To communicate this historic decision was the president of the Federazione Italiana Giuoco del Calcio (FIGC) Carlo Tavecchio (2017) at the final stage initial League Assembly in Rome, the Italian capital. The latest VAR Protocol version released by the International Football Association Board or IFAB (2019), which is the body in charge to establish any modification and innovation of the “Laws of the Game”, constitutes the legislative basis on which the sport of football is based. It describes its modality, purpose and structure, explaining how the Video Assistant Referee works with all its related principles. The introduction of slow-motion footages has meant a great change in the history of football: if it had been used in the past, many refereeing errors could have been avoided that on many occasions have altered the outcome of a game. The purpose of the VAR in football is, precisely, to check and possibly correct arbitration decisions in the event that the referee has made a mistake, or to report serious episodes, where the referee has not been able to see. As when the Fédération Internationale de Football in acronym FIFA (2017) helped summarizing these concepts, showing the steps to take into consideration of how VAR would be used at the 2018 FIFA World Cup, in particular it explains the several steps from when the incident occurs on the field, to when the decision or action is taken by the referee. The most significant aspects to understand are that the match official may utilize the *review on the field* only when certain episodes occurred, such as uncertainties uncertainties of Goal/no goal, Penalty/no penalty, Direct red card (not second yellow card/caution) and Mistaken identity of a player unfairly expelled.

The FIGC (La Federazione Italiana Giuoco Calcio), as explained by the Special Commissioner Roberto Fabbricini (2018), was among the first federations to promote the use of VAR, introducing this technological tool in the Serie A and creating a permanent center in Coverciano (neighborhood in the southeast area of Florence, where the FIGC’s headquarters is also located), in order to train referees. The team work carried out through the collaboration of the Serie A and the AIA (Associazione Italiana Arbitri) has allowed them to achieve very positive results in regards of the first season, which confirmed the value of the refereeing class and allowed Italy to play an increasingly central role in the international football system. Also, the increased feature in decisions claimed by match officials thanks to the technological aids, takes care of the principles of the sport and cooperates with broadcasters to create additional qualitative content at the service of paying subscribers (AIA, 2018).

Once the definition and essential functions of how the VAR works are explained, it is now possible to proceed to retrieve and to collect reliable data in order to understand how its

introduction in the season 2017/2018, influenced the game in the Serie A under a statistical point of view.

Favouritism and Referee Bias in Professional Football

According to the “Laws of the Game” (2019), a referee’s decision-making procedure is a complex duty which implicates making correct judgements on fast gameplay situations with numerous players and possibly limited visibility (Lex, Pizzera, Kurtes, & Schack, 2015).

There have been several studies that showed referee bias tends to favor greater football clubs and home teams (Garicano, 2005; Boyko, 2007). The study carried out by Garicano demonstrates how professional football referees are more likely to “support” the club which is hosting the game, with the purpose of satisfying the spectators in the crowds. He lately found that match officials consistently benefit home clubs by reducing tight matches, accurately where the home club is winning, and prolonging tight matches where the home club is losing. Notwithstanding, they express no such prejudice regarding matches that are not tight in relation to the result. In addition to this, in more recent times, it has been analyzed that referees could be biased in favouring higher ranked teams in close games (Lago-Peñas & Gómez-López, 2016). The sample conducted by Lago-Peñas consists of all the 380 matches in the highest Spanish football league, La Liga occurred during the 2014/15 season. The dependent variable taken into account was the Injury time (minutes added at the final stage of the second half) that the match official chooses to add to only the second half. While, the independent variables were the Yellow Cards, Red Cards, Score Difference, Player Substitutions, Attendance Rate, and Fouls awarded. As a result, a linear analysis indicates that the higher the goal discrepancy enclosed by clubs, the less injury time was supplemented by the referee in charge to arbitrate. Nonetheless, in tight football matches, referees were more likely to increase the injury time for a “stronger” football club when they were behind and give less injury time when they were leading the result.

As a consequence, doubtful and incorrect decisions taken by the match official during games are various and may definitely directly affect the final outcome of the game (Albanese, 2020). In addition to this, these decisions can have remarkable connotations in terms of money loss for football clubs, including all the staff, from managers, to players (Helsen et al., 2006; Kolbinger & Lames, 2017). Here, the introduction of technology at the service of referees takes on an even more decisive role in order to make more impartial and unbiased decisions. However, in order to understand how VAR modify the game in the Serie A from a statistical perspective, variables and data such as fouls, Yellow and Red Cards, Goals, Offsides and Penalty Kicks must be collected from a reliable source (Kalén, 2019).

A study conducted by Scientists and Professors Hongyou Liu, Will Hopkins, Miguel A. Gómez and Javier S. Molinuevo (2013), article which is also part of “The International Journal of Performance Analysis in Sport”, shows the assessment and calculation regarding the reliability system behind the OPTA technology, that focuses on providing sports data processing by

OPTA Sportsdata Company. As a result, the research shows that the OPTA Client System is considered trustworthy to gather live football game data. Therefore, the web-portal “Whoscored” (www.whoscored.com), that focuses on highly-detailed football match statistics, has been recognized and approved as reliable sources of match data by OPTA Client System, reaching an acceptable level of Cohen's kappa coefficient (κ) (statistic that is used to measure inter-reliability for qualitative items), intraclass correlation coefficient (ICC), (descriptive statistic that can be used when quantitative measurements are made on units that are organized into groups, describing how strongly units in the same group resemble each other) and The Standard Error of Measurement (SEM) value (measure of how much measured test scores are spread around a “true” score, useful to a test taker because it applies to a single score and it uses the same units as the test). Therefore, the statistics generated from the system could be used validly for academic research, which means that *Whoscored's* website is available for the purpose of the first research question, that is, to understand the statistical changes occurred in the Italian League after the VAR introduction.

As shown in Table 1, some of the findings were more impressive than others, showing that total players caught in offside is likely the most significant change influenced by the VAR system, highlighting a remarkable decline after its implementation into the Serie A. The chart (Table 1), situated in the appendix, is called “Serie A Statistical Analysis and is a result of data personally retrieved from 1520 football matches regarding the four different seasons, later used to draw analytical graphs and conclusions. The variables I took into consideration were: Yellow Cards, Red Cards, Penalties, Goals, Fouls and Offsides. The graph is particularly useful to understand change after the VAR introduction in the top Italian division. A decrease in the number of fouls and yellow cards has been seen for the very first season (2017/18). However, the numbers grew significantly during the next season (2018/19), therefore, in this matter, no impressive or notable change has been demonstrated. Furthermore, Federcalcio and the company *HAWK-EYE Innovations*, the company provider behind the technology which made possible the realization and use of the VAR system during official games, released an official document called “VAR Project Report” (2018). The document is useful on account of it analyzes the effective playing-time, injury time, players’ protests as well as simulations, for three seasons (2015/16, 2016/17 and 2017/2018), therefore it compares the statistical changes before and after the Video Assistant Referee’s implementation in the Italian league.

Stakeholders’ perception over the VAR

As reported by Antonio Giangrande (2020), the general opinion over the introduction of the VAR in the football world, it is not yet well defined, generating many conflicting debates and assumptions about its efficiency. He also claims that changes or new introductions of technology in a sport, can influence the style of the game as well as can affect its performances. Therefore, criticism among people may arise (Dyer, 2015).

Furthermore, various studies have demonstrated that match official’ decisions can be altered by several aspects such as crowd noise, social pressure, match status or the history of

the clubs (Heuer, Riedl, Strauss, & Rubner, 2015; Unkelbach, & Memmert, 2010). Thanks to the reports released by AIA (2019) and FIGC (2018), and also based on the statistical analysis previously mentioned consisting of 1520 Serie A matches combined, it is now possible to determine whether the game has become faster, more aggressive or more engaging, consequently discovering if arbitration decision mistakes are reduced. The data according to the final report of the “VAR Report Project” (2018), validates what just claimed. Out of 2023 interventions of the Video Assistant Referees, there were 117 arbitral corrections (5.78%) and only 18 errors (0.89%) committed (Lega Calcio Serie A, 2018). However, even though the body that determines the “Laws of the Game” of association football, IFAB encourages and promotes its philosophy as a “minimum interference for maximum impact” use of the technology (2017), an overall sense of disapproval stands across fans concerning the actual amount of time spent in order to review incidents (Arastey, 2020). Although the VAR principles cited in the VAR Protocol (2019) appear to be precise and clear, principles that have also helped improve the game towards a more honest and fair judgment method, Giangrande’s belief was confirmed. This can be verified on account of the introduction of a revolutionary technology in a complex sport such as football had caused many controversies from its very first game in the 2017/2018 season in the Serie A.

In accordance with that, in one of the following sub-chapters are reviewed seven of the most striking and doubtful episodes occurred after its implementation in the Serie A. Episodes wrongly judged or interpreted that the VAR and the referee combined were not able to handle properly, altering the final outcome of games and contributing to raise general disapproval and skepticism among fans concerning its essential use and purpose. Following these critical situations, managers, players or club’s owners started arguing publicly by questioning and by raising once again a problem linked to the approach of VAR rules, causing many debates with the AIA (Ancelotti, 2019; Commisso, 2019; D’Aversa, 2020). The most noteworthy aspect of all the disputes supported by the latter is referred to an interesting principle mentioned in the VAR Protocol (2019). IFAB (2019) in the first point of this official document claims once again that:

“A video assistant referee (VAR) is a match official, with independent access to match footage, who may assist the referee only in the event of a ‘clear and obvious error’ or ‘serious missed incident’ in relation to the four episodes such as goal/no goal, penalty kick, direct red cards or mistaken identity”.

Therefore, it is supposed that the video assistant referee will systematically review the decision for any hypothetical clear error brought by the referee, advising the referee whether there is a mistake to be corrected. On the other hand, as later demonstrated in the sub-chapter *The most striking and discussed cases after the VAR’s debut in the Serie A*, there had been various cases where the VAR failed to judge, to interpret and to report certain episodes correctly.

As previously mentioned, Italy was one of the first countries in the world to experiment with technology in football. The VAR approval granted by IFAB, in fact, was introduced by an

off-line test period in the top Italian championship which produced sensational positive outcomes, committing remarkably to the full application of the decisive and final VAR protocol (Armenteros, 2019). In addition to this, Italy wants to approach the numerous controversies and protests that have emerged and have been expressed after the VAR introduction by improving its system and approach. In fact, as reported by many sports sources (Sky, 2020; Sport24, 2020; Calcioefinanza, 2020), an important novelty could soon arrive in the Serie A league, which would be the promoter of the *challenge* experiment, that is, the call to the on-field review of the VAR by the teams, in simpler words, managers or players would be empowered to claim a VAR review during a football game. The proposal was made by the FIGC (2020), which underlined, in a press release on its website, the desire to listen to the petitions collected from numerous football clubs, informing FIFA of its desire and will to test the usage of the challenge during the Serie A. The Italian Federation's ambition is just to "silence" all worries that have arisen from using the VAR, by proposing a review of the modern approach and testing it then in the Italian league. In fact, the FIGC claimed it has acted as interpreter of the several requests received during the first phase of the current season (2019/20).

The VAR challenge, is a concept also based on the National Football League (NFL) model, where there are two challenge options for coaches, and where the request is made by throwing a red rag on the field to catch the attention of the referees before the next action has started (Raiders, 2019). Similar principle is currently used in the National Basketball Association (NBA), cited in the *NBA Official Rulebook - Session 1* (2019), where: "A head coach may trigger instant replay review of certain events subject to the terms and conditions set forth in this rule. Instant replay review triggered pursuant to this rule shall be referred to as a Coach's Challenge (or "Challenge" for short) and each team is entitled to one *challenge* throughout the entire game". The Federcalcio is convinced that, by continuing the path already undertaken, with the further concept of the *call to the on field review* by teams, or so-called, "challenge", football can be brought into a dimension ever closer to the millions of passionate, without affecting the authority of the referee but by providing him with concrete tools (FIGC, 2020).

In support of this idea, several football entities, disappointed by the current efficiency of the VAR, have already declared their eagerness for a change towards this innovative idea and towards a radical shift, a few years before FIGC did. An example is the President of FC Torino Urbano Cairo (2018), who recalled all the episodes that disadvantaged his club during the first months of the 2017/2018 league and that consequently might have changed or influenced the fate and the final result of the match. Thus, the final chapter of my study is fully dedicated to understanding what the general perception is and how the new concept could be adapted to the Italian football league.

Chapter 3: Methodology

To answer my first research question, I built a sample which consists of a dataset of all football games occurred in the Serie A from the 2015/16 to 2018/19 season, both seasons involved. The analysis precisely includes 1520 football games (720 matches with VAR and 720 without VAR). The Video Assistant Referee (VAR) system was implemented in top European leagues by the Serie A at the beginning of the 2017/18 season. As a consequence, the two seasons before and after its introduction were examined and analyzed.

To the best of my knowledge, only few studies were accomplished for the use of VAR in soccer yet (for instance Lago-Peñas, Rey & Kalén, 2019). Thereby, the initial aim of this study was to explore how the introduction of the VAR system altered the game in a niche football league, such as the Serie A.

While the second part of this study aims to explain and present the new VAR challenge. A concept born due to the multiple controversies arose after the implementation of this technology aid from its very first year, that, if accepted by IFAB, might transform the future of elite football. I took the liberty to make three assumptions or hypotheses before proceeding with the statistical analysis in order to formulate testable predictions about how I expected the VAR to have modified the game. (i) The first and second half will last significantly longer, due to a boost of minutes granted to the injury time, on account of interruptions and time dedicated to review certain episodes; (ii) the referee decisions will be stricter, therefore the number of red and yellow cards will increase with the VAR system; (iii) the VAR will cause no difference in terms of goals, fouls, offsides or penalty kicks conceded.

In order to test these hypotheses, various variables were assembled in correspondence with all the football games taken into consideration. The initial and surely the most relevant source was the Whoscored website (www.whoscored.com), which provides detailed statistics for the top five tournaments in Europe and more via Opta. Since the data concerning the Injury time and Effective Playing time was not always available in this dataset, I expanded the data retrieved from this website with additional information from the VAR Project Report released from Lega Serie A (2018).

However, before proceeding to investigate into the statistical analysis in detail and before introducing the new VAR concept, it is important to explain the definition as well as the current situation regarding VAR implementation into the elite Italian Football.

The “VAR Protocol”

The VAR, once again the acronym for Video Assistant Referee, is the technological system experimentally adopted by the Serie A league starting from the 2017/2018 season. This is a referring method, chaired by two referees, or additional assistants: the VAR and the AVAR

(where the initial "a" of the second's word stands for assistant to the VAR); in other words, a support available to the referee on the field, with the purpose to make correct decisions during the game. According to the report released by IFAB, the "VAR Protocol" complies to the principles and philosophy of the "Laws of the Game". It consists of a group of regulations which must be respected and applied in every game where the var is involved. It is essential to note that the exercise of this modern device is exclusively authorized where the host or the organizer of a football game, has fully satisfied and accomplished all the factors and principles shown within the "VAR Protocol" (as exposed in the "Laws of the Game") and later has received the approval from IFAB and FIFA combined, to operate to use this technology. There are four different moments that, by regulation, mark the VAR procedure, that is the entire process of utilizing the technological means at the service of the referee in charge to the final decision that is always up to the match official (FIFA, 2019). The procedures are the following:

1. Initial decision of the referee
2. Control
3. Revision
4. Final decision

Fundamental Principles

The following pictures (Picture 1 and Picture 2) represent the twelve principles concerning the "VAR Protocol", an extract from the "Laws of the Game" and released by IFAB in 2019. Principles which determine when the VAR can be utilized and with further procedures too.

1. A video assistant referee (VAR) is a match official, with independent access to match footage, who may assist the referee only in the event of a **'clear and obvious error'** or **'serious missed incident'** in relation to:
 - a. **Goal/no goal**
 - b. **Penalty/no penalty**
 - c. **Direct red card** (not second yellow card/caution)
 - d. **Mistaken identity** (when the referee cautions or sends off the wrong player of the offending team)
2. The referee must always make a decision, i.e. the referee is not permitted to give 'no decision' and then use the VAR to make the decision; a decision to allow play to continue after an alleged offence can be reviewed.
3. The original decision given by the referee will not be changed unless the video review clearly shows that the decision was a 'clear and obvious error'.

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Laws of the Game 2018/19 | VAR protocol

Picture 1. Extract from the “Laws of the Game” 2018/19 report - “VAR Protocol” released by IFAB

4. Only the referee can initiate a ‘review’; the VAR (and other match officials) can only recommend a ‘review’ to the referee.
5. The final decision is always taken by the referee, either based on information from the VAR or after the referee has undertaken an ‘on-field review’ (OFR).
6. There is no time limit for the review process as accuracy is more important than speed.
7. The players and team officials must not surround the referee or attempt to influence if a decision is reviewed, the review process or the final decision.
8. The referee must remain ‘visible’ during the review process to ensure transparency.
9. If play continues after an incident which is then reviewed, any disciplinary action taken/required during the post-incident period is not cancelled, even if the original decision is changed (except a caution/sendoff for stopping a promising attack or DOGSO).
10. If play has stopped and been restarted, the referee may not undertake a ‘review’ except for a case of mistaken identity or for a potential sending-off offence relating to violent conduct, spitting, biting or extremely offensive, insulting and/or abusive gesture(s).
11. The period of play before and after an incident that can be reviewed is determined by the Laws of the Game and VAR protocol.
12. As the VAR will automatically ‘check’ every situation/decision, there is no need for coaches or players to request a ‘review’.

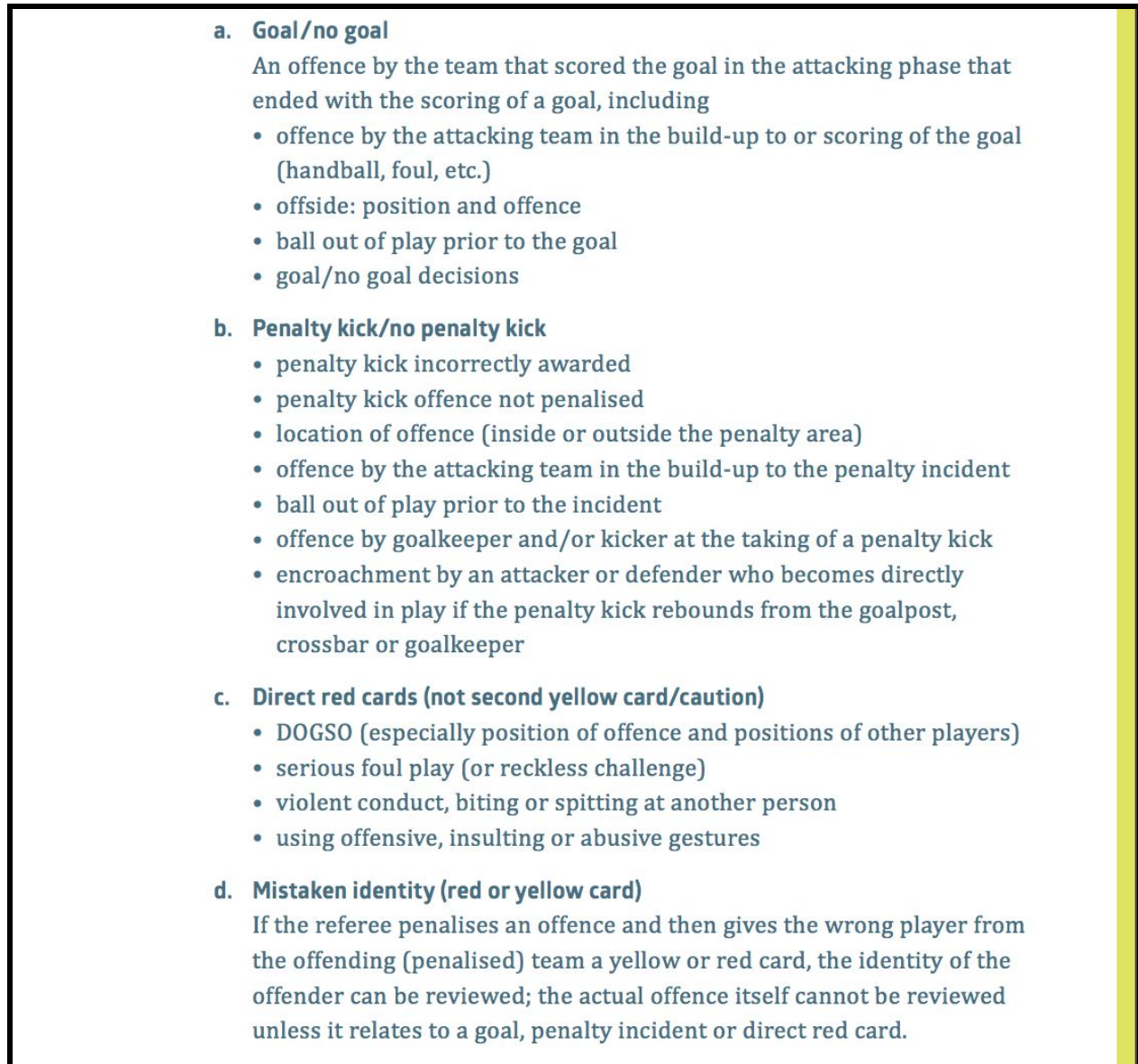
Picture 2. Extract from the “Laws of the Game” 2018/19 report - “VAR Protocol” released by IFAB

VARs, episodes and decisions subject to review

Now, the time has come to analyze more closely what the principles of the VAR are and how the technology works, but above all, when its utilization is necessary.

As reported by the “Laws of the Game” (LOTG) (2019), which are the codified rules of association football drawn up by IFAB, the VAR is a referee who has autonomous reach to the footage of the game, and who can only intervene in case of serious and obvious error, as well as in the matter of a severe unseen episode occurred during the match. So far, the concept seems clear; but, can the VAR intervene for any doubtful episode? The answer is no. From the year 2018, IFAB, entitled to draft changes and innovations to the rules of football, has in fact established a more restrictive interpretation of the VAR usage, which can only intervene in the event of a “clear and obvious error”. As previously specified by the “VAR Protocol” in point 1,

the referee may use the *moviola* (a term used for reviewing an action) on the field only under certain circumstances (Picture 3):

- 
- a. Goal/no goal**

An offence by the team that scored the goal in the attacking phase that ended with the scoring of a goal, including

 - offence by the attacking team in the build-up to or scoring of the goal (handball, foul, etc.)
 - offside: position and offence
 - ball out of play prior to the goal
 - goal/no goal decisions
 - b. Penalty kick/no penalty kick**
 - penalty kick incorrectly awarded
 - penalty kick offence not penalised
 - location of offence (inside or outside the penalty area)
 - offence by the attacking team in the build-up to the penalty incident
 - ball out of play prior to the incident
 - offence by goalkeeper and/or kicker at the taking of a penalty kick
 - encroachment by an attacker or defender who becomes directly involved in play if the penalty kick rebounds from the goalpost, crossbar or goalkeeper
 - c. Direct red cards (not second yellow card/caution)**
 - DOGSO (especially position of offence and positions of other players)
 - serious foul play (or reckless challenge)
 - violent conduct, biting or spitting at another person
 - using offensive, insulting or abusive gestures
 - d. Mistaken identity (red or yellow card)**

If the referee penalises an offence and then gives the wrong player from the offending (penalised) team a yellow or red card, the identity of the offender can be reviewed; the actual offence itself cannot be reviewed unless it relates to a goal, penalty incident or direct red card.

Picture 3. Extract from the “Laws of the Game” 2018/19 report - “VAR Protocol” released by IFAB

The intervention of the Video Assistant Referees is allowed **only after the referee has made a decision on the controversial episode**. This means that the match official, as well as his assistants, **must operate as if the technology were not there**. The only exception allowed is in the event that a serious episode escapes the referee. In this circumstance, yes, the intervention of the VAR is allowed even without a prior decision by the match official (FIFA, 2019).

The VAR Execution Process

According to IFAB (2019), the principle of the use of the VAR is simple and twofold as following:

1. Trying to correct match official decisions that are obviously wrong
2. Report serious or particularly noteworthy incidents escaped the referee

From the pitch, the match official is directly connected via headset to the VAR and AVAR, which are positioned in a room inside the stadium, denominated Video Operation Room, (VOR). The referee is constantly communicating with these latter, who have the task of solving the most controversial situations. The following are the three stages belonging to the communication procedure:

1. The VAR and AVAR inform the referee about a dubious decision and, therefore to be reviewed or the referee requests that a dubious situation be reviewed at slow motion.
2. The VAR and AVAR review the video images, explaining to the referee what happened.
3. To take a decision, the referee can review the video on the sidelines in the *Referee Review Area*, by interrupting the game and mimicking the gesture of the video, and making the correct decision or trusting the judgment of colleagues (and attention: an action cannot be changed if this signal was not shown).

Whether the match official chooses not to interrupt the game for an alleged infringement, the decision **cannot be re-examined** with the help of the assistants, **unless the *moviola* distinctly demonstrates that the decision was a "clear and obvious error"**. In this case, the match officials within the VOR, can **only suggest** a "review" to the referee on the field.

In the Serie A, after the infringement has been examined thanks to the details indicated by the Video Assistant Referee or followed by the match official in question that has solicited an "On Field Review " (OFR), it is always the referee who is empowered to take the final decision over the offence occurred (FIFA, 2019).

Another fundamental point of the slow motion on the field is the exclusivity of the call: only and exclusively the game official can start a review while all the other assistant referees, including the VAR, **can only suggest** it. During the review phase (whose action can be reviewed both in slow-motion and at normal speed) and, even more so, during the consultation of the video, the referee must always remain as "visible" as possible, so as to ensure maximum transparency of judgment.

Finally, when after a review the game continues, any measure taken during that fraction of time **will not be canceled**, unless it is a discharge to a yellow card awarded for the interruption of a potential goal action or for Denying An Obvious Goal-Scoring Opportunity

(DOGSO), i.e. all those infractions that deny the possibility of a goal and occurred within or outside the penalty area and which lead to the potential extraction of a card by the referee.

Serie A Statistical Analysis

In the study called “Favouritism Under Social Pressure”, one of the authors Luis Garicano (2005), explained that match officials were more inclined to give more injury time at the final minutes of the second half, more precisely when the team is hosting the match was losing by a goal rather than if it was leading by one goal. In accordance with this ideology, the Professor Andrea Albanese (2020) examined if the implementation of further assistant referees was related to the match official prejudice as regards of home and greater team favouritism concerning the UEFA Europa League (2009/10 season) and the UEFA Champions League (2010/11 season). As a result, he discovered a relevant home and favouritism in favour of clubs with longer history or economical more powerful, before the implementation of further match officials, however, no such proof has emerged later yet. Furthermore, the implementation of further match-referee assistants resulted in having an increase in yellow cards in regards of both home and away clubs. Boyko et al. (2007) has demonstrated from a study that examines the final results of 5244 English Premier League (EPL), taking into account 50 match officials actions, that individual referees give remarkably various criterias of home favouritism, highlighting that sports with arbitrating prejudices or bias are more likely to experience greater home advantage and that referee’ decision-makings can be altered by crowd noise.

On the other hand, in more recent times, it has been implied that match officials could be biased in favouring greater football clubs in tight games (Lago-Peñas & Gómez-López, 2016). Consequently, incorrect decisions called by the referees during official games are numerous and, as a consequence, might cause an immediate implication on the ultimate outcome of the match. As a result, these decisions might also cause remarkable connotations in terms of money loss for football clubs, as well as repercussions on the staff, including managers and players (Helsen et al., 2006; Kolbinger & Lames, 2017). Therefore, technological devices tools which aim to increase the standard of the refereeing grade such as VAR, plays an even more crucial part in preventing wrong judgements and favouritism.

The study I personally conducted consists of investigating outcomes of 1520 games of four seasons of the Italian top division, the Serie A. Precisely, the following quantitative variables were registered for each game: Goals, Offsides, Fouls, Penalty Kicks, Yellow Cards, Second Yellow Cards and Red cards. The data for this study was retrieved from the official websites “Whoscored” (www.whoscored.com) thanks to the assistance of the VAR Project Report released from Lega Serie A (2018) to gather the Effective Playing Time and Injury Time. A fundamental aspect was key to establish the trustworthiness of the website in question. In fact, *Whoscored* is recognized by OPTA Client System, a system which is approved to gather football match data and was recognized by world leader football data provider, OPTA Sports (Liu, Hopkins, Gómez, & Sampedro, 2013).

Chapter 4: Findings

The charts situated in the appendices are retrieved from an excel file I created. The results are a consequence of the total variables achieved by the twenty Italian teams throughout the four seasons from 2015/16 to 2018/19.

After the video assistant referee was implemented in the Serie A, as shown in Figure 1 and Figure 2, a drop in the number of yellow cards and fouls awarded during each game, has been seen concerning the very first season (2017/18). On the other hand, the following season (2018/19), numbers grew remarkably. I personally suppose that the first year decrease might be on account of players being more concerned about further judgement by the implementation of the technological officiating aids, therefore they became less “aggressive”. However, once they saw and tested “on their own skin”, they embraced, understood and adapted to the change quickly, becoming more “aggressive” the following season (2018/19) causing an increment in total yellow cards (Figure 1) as well as total number of fouls (Figure 2). Something that we do not see in Figure 3, a chart inherent to the total red cards. Even though the number was decreasing already from season 2016/17, it does not show any sign of regrowth in the following years after the VAR was introduced. In regards to penalty kicks (Figure 4) and goals (Figure 5), the current situation suggests that no dramatic changes have been revealed following the VAR insertion in season 2017/18. Even though there has been a drop for both variables after its insertion, numbers are close to the season 2016/17 and both graphs show a stable flow with no radical shift.

Moreover, comparing the Serie A data monitored by the Var with the 2016-2017 league, it's clear that the players have changed some of their habits. In just one season, the total number of yellow cards awarded by the referees has dropped: -12.3%, from 1'719 in the 2016/17 season to 1'508 in the 2017/18 season (Table 1). A decrease in the number of Red Cards has been seen as well: correlated with the earlier season: -7.1% (97 season 2016/17, 91 season 2017/18). As shown in Figure 6, the total players caught in offside is probably the most significant change influenced by the VAR system, resulting in a remarkable drop. A study conducted by Kolbinger and Lames (2017), errors in offside calls might be demonstrated based on perceptual limitations. Additionally, Oudejans (2002), who is part of the Research Institute MOVE, Faculty of Human Movement Sciences, at the VU University Amsterdam determined that assistants to match officials are not well located related to the offside line for 86.5 % of the observed offside calls. As a consequence, he concluded that the largest share of wrong judgments concerning offside appeals are influenced mainly by inadequate placement. However, Helsen (2006), Head of the Perception and Performance Lab at the *KU Leuven*, claims that the factor that affects the majority of those appeals, is the so-called “flash-lag effect”. This last term is a visual illusion of a moving object that the human eye perceives to see ahead of its actual position. Part of the goal of the application of the VAR technology to professional football is to prevent these misjudgements or mistakes made by the match officials from

happening, therefore, with the purpose to correct these calls. Based on Figure 6, the actual results exhibit that there is a symbolic recession in terms of offsides after its implementation into the Serie A.

On the other hand, according to Lega Serie A Calcio and AIA (2018), thanks to the review technology on the pitch, 59 penalty kicks that were not seen by the referee and 42 goals were awarded. In addition to this, 16 red cards were awarded thanks to the assistance of the VAR. Without the Var, the percentage of arbitration errors would have been 5.7%, later limited to 0.89% in the first year in which the project was introduced in Serie A. The report also indicates the aspects to be improved: the audio system which in some cases has created malfunctions; the uniformity of the intervention line restricting the concept of *clear and obvious error*; time optimization to avoid overlaps between the referee's review of the video and the referee on the pitch and the introduction of Hawk Eye software to position the offside line. But beyond the interventions to change decisions already made by the referee, the VAR had a very strong impact on the players' behaviour on the pitch. In addition to this, according to the same Final Report "Video Assistant Referee Project" (2018), the following are further results useful to understand the impact that VAR had in the Serie A after its very first year of application:

- **Injury time:**

Compared to the previous season: +13 "(5'28" season 2016/17, 5'41 "season 2017/18)

- **Effective playing time:**

Compared to the previous season: +43 "(50'30" 2016/17 season, 51'13 "2017/18 season)

- **Protests:**

Compared to the previous season: -17.5% (137 season 2016/17, 113 season 2017/18)

- **Simulations:**

Compared to the previous season: -35.3% (34 season 2016/17, 22 season 2017/18)

- **Total Red Cards for Protests:**

11 reds for protests in the 2016/17 season, while 1 in the 2017/18 season.

Compared to the previous season, injury time has increased on average by 13 seconds (5'28 "for 2016/17 season, while 5'41" 2017/18 season). As for the effective playing time compared to the previous season, an increase of 43 seconds has been seen. (50'30" season 2016/17, 51'13" season 2017/18). Consequently, it seems that the VAR system does not substantially increase the injury time added by the referees. In addition to this, even though the length of the game was slightly increased, supposingly due to the interventions of the VAR that generally took certain amount of time, the effective time played, or in other words, the percentage of minutes in which the ball was in play has increased, making the game more interesting and more engaging (Federcalcio, 2018).

How does video assistant referee improve the game?

The VAR was to be used to allow the referee to have a comparison to improve the game and reduce errors. Technology has “almost” entirely eliminated ghost and offside goals from matches: this alone can already be considered a great result. The help of another referee in front of a screen then improved the quality of work of the match official on the field and canceled the consequences of many polemical incidents. It no longer makes sense to question the usefulness of this tool, as we often hear after each controversial episode, and we cannot think that a referee in front of the TV can completely eliminate injustices.

According to the official website of Associazione Italiana Arbitri or AIA (2018), during the first season of the VAR introduction, the article shows that the VAR was used in 397 matches between Serie A TIM and TIM Cup in total, with 2,023 checks carried out and 117 refereeing decisions changed (on average 1 intervention every 3.29 matches).

Despite numerous criticisms, it is undeniable that the VAR has drastically reduced, if not eliminated, some situations in which, previously, would have generated multiple criticism and perplexity. Clear is the matter of the offside goal (Figure 6). As previously announced, the help of the new technology has practically exhausted any type of protest, controversy or doubt. In most cases, even if it was a millimeter offside, every action that ends with a goal is detected and reported in real time by the VAR (HAWK-EYE Innovation, 2019). Nowadays, thanks to the VAR, it is possible to determine precisely whether there is an offside by removing practically any possibility of error and therefore its intervention on this aspect of the game has certainly been positive.

As point 12 of the VAR Protocol expresses (2019), *no player, member of the technical staff or manager must categorically surround, influence or press the game director*. In the event of this occurrence, the match official is required to expel the manager or staff member or to extract the yellow card if the player mimics the gesture of the review signal, which reproduces the outline of a television, or enters the referee review area, the area from which the central referee reviews the actions. Hence, there has been a decline regarding the number of complaints by team members, limiting the controversies. In fact, always according to the VAR Project Report (2018), the impact of the VAR to players and managers' behaviour during a game has significantly improved. It is important to remember that one of the most striking aspects of improvement is conquered by the voice of simulations and protests. The total number of protests for the season 2017/18 was 113, while 137 for the season 2016/17 had decreased by -17.5%, while the drop in simulations in the 2017-2018 season was 35.3%, from 34 cases to 22. Statistics that make us reflect that the epochal experiment of slow motion on the field has won, across the board. Even though the VAR concept may need some correction within its protocol, the first year of VAR deserves to be counted as a sporting success.. A “small mole” is represented by the statistics that highlights how the VAR has still led to 18 errors, of which decisive for the result. A mole that certainly needs to be worked on and improved. However, the

overall balance remains highly positive and the statistics clearly show that the path taken is correct.

VAR causing debate in Serie A

One of the main criticisms of real-time video-replay devices such as VAR is the potential break of the game to check the video of a controversial incident. It might be disruptive, especially in matches played in cold atmosphere (Dyer, 2015; Svantesson, 2014). Otherwise stated, numerous spectators or fans have claimed the process of reviewing the action influences the course of the game. Although IFAB (2017) encourages and promotes the VAR philosophy as a "minimum interference for maximum impact" use of the technology, a general sense of criticism endures amongst fans regarding the actual amount of time spent in order to review incidents (Arastey, 2020). In addition to this, according to Gary Lineker (2019) spectators or football fans are not always conscious of when a decision is being checked, specifically for reasons when the game is played in stadiums which are not provided with big screens, but with a loudspeaker announcement. The transparency of the referee's decision-making process is, at the moment, totally lacking, as communication and interactions between the referees and the Video Operation Room are not yet made available for audience listening. A further section of serious focus in the exercise of technology for arbitration decisions is the rigorous and essence of the "Laws of the Game". Even though referees are now able to consult video footage after a dubious incident has occurred, arguments and conflicts concerning penalty kicks as well as additional episodes still endure. In terms of decision making, people's judgment or opinion remains a crucial aspect to be considered. Recommendations have arisen about today, being a right moment to better define principles within the "VAR Protocol" (Arastey, 2019).

Even though the previous principles cited in the "VAR Protocol" seem to be very clear and strict, principles that have also helped improve the game towards a more precise and fair judgment method, VAR had caused many controversies from its first game of insertion in the 2017/2018 season in the Serie A. It was supposed to be the technological tool that should have ensured greater transparency. With the use of the VAR, it was said, the referee's margin of error would drop dramatically. It is partly true. The data according to the *Final Report of the "Video Assistant Referee Project"*, on the other hand, confirms what just said. As mentioned above, during the first year of VAR in Serie A, results have been quite positive. Out of 2023 interventions of the Video Assistant Referees, there were 117 arbitral corrections (5.78%) and only 18 errors (0.89%) committed (Lega Calcio Serie A & AIA, 2018). However, those who thought that there would be no further dubious episodes and complaints, were highly mistaken.

The most striking and discussed cases after the VAR debut in Serie A

I decided to consider some of the most impressive and mind-blowing episodes after the year of the debut of the VAR in the Serie A, in the event of when the VARs had failed to do their job correctly. Episodes wrongly judged and misinterpreted that the VAR and the referee combined were not able to handle properly, altering the final outcome of games and contributing

to raise further skepticism or criticism across people regarding its essential use and purpose. There were several questionable situations between the first and the beginning of the second leg concerning the 2016/17 and 2017/18 seasons, that, for various reasons, it would be necessary to open more than one debate. However, we have chosen to select only a few to act as an example. The following eight episodes are all in relation to the four principles (Goal/no goal, Penalty/no, penalty, Direct red card, and Mistaken identity) in order to make a review possible, suggested by the VAR:

1. **Roma Crotone 1-0** (06.10.2017) - **Non-existent penalty contact**

An episode that made people question and discuss over the technology's assistance and human perception in the Serie A, occurred during Roma-Crotone. The penalty awarded to the *Giallorossi* by referee Manganiello of Pinerolo caused huge controversy: Rolando Mandragora's intervention (Crotone's defender) on Aleksandar Kolarov was sanctioned, with the Serbian side definitely accentuating the contact, simulating blatantly. As it is possible to deduce from the image below, the contact between Mandragora and the Serbian full back of AS Roma has never occurred. Here the VAR should have intervened and should have informed the referee of the non-existent contact, unfortunately, it did not happen.



Image 1. Rolando Mandragora (in white) and Aleksandar Kolarov (in red)

2. **Roma SPAL 3-1** (01.12.2017) - **Goal in Offside**

Eusebio Di Francesco, manager of AS Roma at the time, was engaged in the league match against SPAL, and ended the first half of the game with two goals ahead. The result also matured thanks to the errors of the VAR (below the shot of the episode) that sparked criticism on social media.

Especially disputed and discussed is the validation of AS Roma midfielder Strootman's goal with the Dutch being in obvious offside. The fans are unable to understand how Pairetto (assigned as the Video Assistant Referee for this match) did not notice the player's position, clearly, in offside, and have not advised the referee.



Image 2. Kevin Strootman's position (in red) in an obvious offside position

3. **Sampdoria Sassuolo 0-1 (17.12.2017) - *Torreira's Handball***

Perhaps the most sensational mistake ever made by referees since they have technological support at disposal. Sampdoria is playing at home against Sassuolo. For large stretches of the game the guests dominate and shortly, after the 80th minute they get a penalty kick. Politano kicks half-height to the right towards the keeper Viviano, who saves and rejects the ball to the right, the Sassuolo midfielder Magnanelli arrives first to the ball and replaces it in the heart of the penalty area where the opponent Torreria literally makes a clearance by using his right hand, in order to stop the cross from the Sassuolo midfielder. Without any kind of logic, the VAR did not advise the referee Gavillucci to review and sanction the game action. The *Neroverdi* will still win the race thanks to a goal of the striker Matri in the final.



Image 3. Sampdoria's midfielder Lucas Torreira saved a cross using his left hand.

4. **Cagliari Juventus 0-1** (06.01.2018) - **Bernardeschi Handball**

The postponement of the twentieth matchday of Serie A season 2017/18 sees Cagliari hosting Juventus at the Sardegna Arena. The *Bianconeri* found the advantage at minute 74 with Bernardeschi. A few minutes later the former Fiorentina player is the protagonist of the refereeing mistake: the Cagliari midfielder Padoin crosses from the left when Bernardeschi intervenes by deflecting the ball with his left arm inside the penalty area. Referee Calvarese does not see it, neither was he advised from the VAR to have a review.



Image 4. Juventus' midfielder Federico Bernardeschi (in yellow) clearly touching the ball with his arm

5. **Milan Lazio 2-1 (29.01.2018) - *Cutrone scoring with his elbow***

A new VAR error occurred on the 22th game of Serie A during the 2017/18 season, when the manager of AC Milan Gattuso hosted in San Siro's stadium, Simone Inzaghi's Lazio. At the 15th minute, AC Milan Cutrone' striker scored with his right elbow without anyone realizing it. Image 5 shows the irregularity. Even for this time, the VAR did not inexplicably advise the referee about the incident. The *Rossoneri* will then win the game 2-1.



Image 5. AC Milan's striker Patrick Cutrone (number 63 in red) scoring a goal with his arm

6. **Genoa Juventus 2-4 (26.08.17) - Galabinov offside**

Another VAR error occurred during the second game of the Serie A 2017/18 season: the VAR did not notify the referee the offside of the Genoa striker Galabinov on the assist addressed to his teammate Taarabt, in the succession of the action the referee Banti awarded a foul in the damage of Juventus' defender Rugani and then assigned the penalty kick to the *Rossoblu*, even though his previous position was in offside. The challenge will end 2-4 for the bianconeri, who will come back after going behind two goals.



Figure 6. Genoa's striker Andrej Galabinov (in red) in offside position before the assigned penalty

7. Napoli Atalanta 2-2: (30.10.2019) - *The Kjaer and Llorente Contact*

The Napoli manager Carlo Ancelotti, after the disappointing draw of the crucial game against Atalanta, unleashed all his anger on Sky Sports microphones: "I would like to understand who referees the matches. I know that Rocchi (another Italian referee) and Orsato do the same. But less experienced referees are more conditioned. I accept Giacomelli's mistake because referees can make mistakes, but I don't accept VAR's mistake. I want to be 100% sure that the referee is making the mistake. "

The attention of the Napoli coach, expelled by Giacomelli for the protests, is focused on the contact between his striker Llorente with the defender Kjaer in the Atalanta's penalty area, not called for a review: "It is a obvious disinterest of the player for the ball, I don't even want to discuss whether it's a penalty or not, it seems obvious to me. This is a decision by the VAR, are we arbitrated by the Var or by Referee Giacomelli? I feel a little disappointed, he was an attack on my seriousness, professionalism, team and society. I would prefer to speak as little as possible ". Then at the press conference the Napoli coach raised the dose: "It is a very simple episode, there was a mistake. **A decision made by the VAR and not by the referee. He had to, at least put the referee in doubt, the person who took the final decision was Banti (assistant referee who was part of the VOR) and not Giacomelli. This is the problem "** .

The response of the referee designator came immediately: "I understand the concept, but I don't understand why we talk about the Var error. It is true that the most expert referees referee the most important matches but we cannot think that all are equal. It is not easy to play Var during league games. **In the case of Napoli-Atalanta, we were wrong not to go and see the episode on the monitor"** (Rizzoli, 2019).



Image 7. The contact between Napoli' striker Fernando Llorente (number 9 in blue) with the Atalanta's defender Simon Kjaer in the penalty area

8. **Parma Lazio 0-1 (09.02.2020) - *The Cornelius and Acerbi Contact***

What saw Parma and Lazio as protagonists was a game that left a trail of controversy behind it. It was generated by some decisions made by the referee Di Bello and in particular one that in the final stages could have changed the fate of the match, as well as the face of the league table. In fact, in the 90th minute the Parma striker Cornelius went down to the *Biancoceleste* area following a contact with the Lazio's defender Acerbi, however the referee did not recognize the extremes for the penalty kick and actually whistled a foul against the striker.

A decision not easily accepted by Parma and that Roberto D'Aversa (Parma's manager) widely criticized in the post-race on Sky microphones, especially because not only the referee did not concede the penalty, but also the VAR did not suggest him a review. "If he had obviously gone he would have had to take the penalty. If you don't use the VAR, you go back, meanwhile, go and see it and then decide. We have seen a blatant episode, if we don't say it we make fun of a city. Not going to see is not accepting an error, it means not being correct. I don't want to disrespect Lazio, but I don't want to be considered stupid either". These were the words expressed by D'Aversa after the game.



Image 8. Parma' striker Andreas Cornelius (in white) evidently pulled down by Lazio defender Francesco Acerbi (light blue)

The new VAR “challenge” concept

The challenge, a term borrowed from other sports, represents the possibility for a team to request the intervention of the VAR to analyze a specific game situation, in case of a discordance with the decision taken by the referee on the field. At present, as from its introduction, the VAR does not provide the possibility for the teams to claim a review of a certain episode, a decision that is still solely and exclusively up to the referee. A statement released by the head of the Serie A's Refereeing Commission Nicola Rizzol (2020), the body FIGC said that it had asked to encourage officials to "intensify" on-field reviews for controversial incidents. As *Repubblica* reports (2020), however, the head of the referees of FIFA Pierluigi Collina would have responded, informally, that Federcalcio argued its fundamental necessity, claiming that he, on behalf of FIFA is absolutely against the introduction of the challenge. This position is due to several reasons, starting from the fact that those who are in front of the VAR screens control everything, with the risk of discouraging them in the event that they are forced to review a particular episode. Without considering that Fifa suggests high the possibility that the complaints will not decrease, indeed they may increase, in the event that the request to review a episode by a coach is not followed by an arbitration decision in favor. Waiting for news on the challenge theme, the FIGC has publicly announced the request to the referees to go more often to review the episodes at the Var, also to avoid controversy that occurred during the previous seasons (CalcioFinanzia, 2020).

Moreover, Figure 7 shows an extract of the “Video assistant referees (VARs) experiment - Protocol” (2017), where IFAB explained their reasons and opinion to not empower teams to appeal a reexamination. Nevertheless, the document initially started raising questions among people, regarding some clarification rules. IFAB, in the latest update of the “VAR Protocol” (2019) made a *tricky* assumption. In fact, they generalize that for any hypothetical *clear error made by the referee, the VAR will automatically check the decision*. Therefore, the VAR is supposed to correct the mistake automatically. On the other hand, we just witnessed by looking at only a few examples within *The most striking and discussed cases after the VAR’s debut in the Serie A’s* section, that there have been several cases where even the VARs may “fail” to judge certain episodes correctly.

Consequently, controversies keep arising among football clubs as well as fans, to the point that people have decided to stand out from the crowd and to support a change within the VAR rules, in order to make decisions as transparent and precise as possible.

General Perception

It is not yet clear how many "calls" will be granted to each team and whether IFAB will lately approve its introduction, as well as if the world board of referees’ consens is needed. However, the foundations to proceed with an official proposal have been laid. In fact, Serie A has already lined up. Here below are presented some of the many thoughts expressed by managers or football clubs’ owners within the Serie A about the possibility to embrace the new concept in the league. The following are some of the thoughts:

- Fabio Paratici (2020), Chief Football Officer for Italian club Juventus, said: "We have always been open to news, then we need to see the terms in which this type of request is made concrete".
- Rocco Commisso (2019), president of Fiorentina, enthusiastically joins: «I am happy that there has been this opening to the requests of the coaches. I want to bring Italian football forward. You have seen what happened to Milan. It's not just Rocco who talks about injustice, there are also other teams. Making progress with the Var will be good for football. "
- Sampdoria coach Claudio Ranieri (2020) sees it as a sign of openness: «Our call can be nice, you have to see how the referees take it. It is one thing that they call it and another that we call it. It is a sign of openness. The referees are more and more competent but something can escape and this machine can be useful for the matches to be more fair and real ».
- Paulo Fonseca (2020), AS Roma coach is in favor but waits to know the details: «I am always in favor of anything that can improve football. But I didn't understand the question well, I prefer to wait before talking about it ».
- Lecce's number one Saverio Sticchi Damiani (2020) is totally in favor: «Already after the protests against Napoli for the penalty claimed against us, I reiterated that it is a problem of rules. So I stick to the proposal. "

- Davide Vagnati (2020), sports director of Spal, is on the same line: "I look favorably on the idea. I believe there may be possibilities for even more clarity in certain episodes. I also think, however, that it must be a limited and limited possibility with clear rules ».
- For so many favorable opinions, one is very much against it. This is Atalanta coach Gian Piero Gasperini (2020): "If it were accepted we would have an unbearable sequence of stops at every game. With the Var, 4 referees work plus other employees who, if they work well, are enough and they advance: here is the problem. Regardless that I absolutely don't want to be a referee. "

Even though the majority of the individuals cited tend to take positions towards the VAR challenge' implementation, the general sentiment or perception is yet not well distinct, since there are still conflicting opinions between those who support the idea and those who are against it. The opinion expressed by the president of ACF Fiorentina Rocco Commisso who in 2019 approved the idea to give coaches the power to call for a review during a football game, may be an interesting thought of why the challenge can be introduced: "VAR must be used and perhaps the time has come when a coach can ask to use it, as happens in other sports ". Commisso comes from the culture of American sports and supports an idea aiming to make the VAR more transparent and, why not, to brighten up a climate that has never been more successful after the many mistakes that have occurred in the past. The president of Fiorentina intervened on the sidelines of an event organized by the "Gazzetta dello Sport" suggesting to put forward the proposal to introduce the challenge, or in other words to empower coaches the chance to ask the referee to watch the episode on the monitor (Commisso, 2019).

Similar opinions to Commisso's are the one expressed by the microphones of *Sky Calcio Club*, when the President of FC Torino Urbano Cairo recalled all the episodes that disadvantaged Turin in the first months of the 2017/2018 championship (2018) and that therefore could have changed the fate and the final result of the match. "Unfortunately there were five games in which they penalized us. I do not want to raise the tone again, I only demand fair treatment . "The number one of FC Torino then continued, making an interesting proposal to change the use of VAR in the Italian championship. Cairo was one of the first managers to ever introduce the concept of the challenge in football, a concept similar to the one used in tennis. Here are the words of Cairo: "I talked about this proposal for empowering a coach to call a VAR, but then journalists disputed myself asking: 'How can the coach have a clear vision of what happened far away from him? ". I correct the proposal live: no longer called by the coach, but by the captain who is on the pitch and close to the action and can have a different view. " The FC Torino's patron then carried on: "The Var that I liked had been introduced is fine, let's just say let's use it a little more. When you have such a good and strong technological tool it is right to use it more." (Cairo, 2018).

Personal Interpretation

As for today, there is still no official procedure for regulating the use of the challenge in the VAR yet. IFAB, the international body that determines the rules of the game of football, will

determine in the upcoming months (2020) how and if, the teams would be able to request the use of the VAR. In that case, there would be mainly two aspects to be defined: the number of calls available to each team and the type of situations in which it will be possible to request a challenge. Since the introduction of the VAR, IFAB has always tried to preserve the natural course of the game, aiming to reduce mistakes, but without altering the essential nature of football. For this reason, a not particularly high number of challenges is conceivable, so that the game is not fragmented by too many calls and safeguard the original objective of the VAR, therefore the number would be limited. Furthermore, I dared to expose my personal hypotheses, details and changes on the current “VAR Protocol” on how the VAR challenge could work in the top Italian division.

First of all, the Principle 12 which says:

...“the VAR will automatically check every situation / decision, there is no need for the coaches or players to request a *revision*”, **must be modified**, since coaches would be empowered to call a review.

As shown in Figure 8, the first Principle of the “VAR Protocol” claims that:

“A video assistant referee (VAR) is a match official, with independent access to match footage, who **may** assist the referee only in the event of a “clear and obvious error” or “serious missed incident” in relation to”:

- a. Goal/no goal
- b. Penalty/no penalty
- c. Direct red card
- d. Mistaken identity

Here, I would like to make two slight changes. Small details, but which completely change the sense and purpose of the rule. My first proposal would be that the VAR **must** review and assist the referee in the event of every suspected contact, irregular position or punishable behaviour in relation to the previous four points. In a nutshell, the whole protocol is based on the sentence contained in the first principle shown in Figure 8. IFAB’ protocol is therefore expected to explain the meaning of the “**clear and obvious error**”. The main problem is that the “VAR Protocol” continues to not provide an univocal definition, limiting itself merely on the particular episodes which it will be possible to intervene and that we all know by now: goals scored, penalty kicks, exchange of person and expulsions, however, decisions can still be reputed according to personal judgements. So the question remains: What is the difference between a clear mistake and a common mistake? Thus, my second humble shift would be to change the adjective by introducing the (slightly wider) concept of “**possible error**”. I believe that it is the best way to handle the latter issue, on account of, conceptually, a clear error presupposes a judgment of merit by the VAR who, in this way, assumes responsibility for the final decision, a decision that **instead must be taken strictly by the referee** (IFAB, 2019). I want to expose my theory and thoughts with example of hypothetical episodes:

- The VAR calls the referee to review, considering an episode as falling under the "clear error" case. It is no coincidence that, in the vast majority of cases, the referees changed their decision once called to the review, essentially reversing what was previously decided on the pitch. In this case, there is no problem;
- The VAR calls the referee to review the images and he/she decides to confirm his choice previously made. Immediate consequence is that one, between the referee and the VAR, made a mistake. It is not my consideration, it is the logic: if the review can be called for a clear error, how can the referee not change his/her choice? Either he was wrong in evaluating the action again, not modifying a clearly wrong choice, or the VAR made a mistake in calling the referee to review the incident on the monitor by having interpreted a correct choice by the referee as a clear error;
- There is a third hypothesis: the VAR does not judge an episode as a clear error, it views it, but does not warn it to the field to allow the referee to review it again. After the match, they realize that the episode is an error (which can happen on the field). Consequently the referee realizes that he has lost something but has not been able to review it for a choice of the VAR. To prevent this from happening, the challenge concept could appease controversies.

In my own opinion, inserting in the protocol the sentence "possible error" instead of "clear and obvious error" leaves much more margin of operation, both to the VARs and to the referee. In fact, a possible error leaves the referee the option to review the action without the almost obvious certainty of having to change the final decision and the VAR will have more margin to allow the colleague to review a so-called "gray" episode, that is to be evaluated according to the sensitivity of the personnel, without being bound to the clear error classification already made by VAR.

In the case of a **doubtful** episode caused by a decision the referee has made in relation to the previous four points (Figure 8), if the VAR **does not** intervene in advising the match official to review the incident, the coach **would be entitled to challenge the decision**, which implies a VAR review by the referee. As the former Premier League (top Football English division) referee Mark Halsey (2020) claimed to the TalkSPORT microphones, "It does hurt when you see these things happen (VAR mistakes) week in, week out. It shouldn't be happening. There shouldn't be human error in the VAR room". Hypothetically, he is right. However, to err is human (Pope, 1711) and despite the VAR is a highly advanced technology-based system which aims to favor more correct arbitral decisions in doubtful cases during key moments of the game, those who control it and take final judgments out of it are always people. Therefore, further mistakes may always occur. By allowing the coaches to challenge the referee's decision when it was not warned or contested to review the incident by the VAR or the AVAR, I believe that the margin of error of arbitration judgments can be minimized, as well as the controversies. The only negative aspect I found regarding this hypothetical scenario is that people may argue that coaches would call the VAR more for tactical purposes rather than for review needs, for instance to allow their players to recover energy, to loosen opposing pressure, or to regroup in the defensive phase.

Chapter 5: Summary, Limitations, Conclusions and Recommendations

Summary

The aim of this study was to create a foundation for further investigations of how the insertion of the Video Assistant Referee (VAR) changed the game and to present how the new VAR challenge concept could be implemented in the top Italian football division (Serie A). In order to achieve these objectives, it was appropriate to elaborate on some precondition goals. Within the Literature Review chapter, it became important to understand and to determine the the concept of what referees bias and favoritism implies as well as how that theory is related to the VAR technology in football. Connected to that attempt, it was essential to develop a proper knowledge about the processes behind VAR as well as the stakeholder's perception over the efficiency after its application to the Italian league. To nourish for the opportunity that VAR effects in Serie A could be observed and evaluated as a reliable component of the study, it became crucial to build a statistical sample with the possibility to understand all the effects and the impact that this latter technology has had on the Serie A. After these essential measures were accomplished, it was possible to proceed forward with the research. This section provides the conclusions, limitations and recommendations that arose from this thesis.

Firstly, an analysis that includes data from 1520 matches over the past four seasons was developed, aiming to understand the changes from a statistical perspective after its implementation in the league. The following variables were registered for every game in the sample: Fouls, Offsides, Goals, Penalties, Red Cards and Yellow cards. Moreover, the *VAR Project Report*, drafted through the collaboration and effort of AIA, FIGC and Lega Serie A Calcio in 2018, was used to identify further quantitative results concerning the effective time played, the injury time of each game, the number of simulations and number of protests occurred during the four seasons reviewed. Over the procedure of assessing each result difference score based on the previous variables, the inclination flow of changes were identified throughout the four seasons, and results are exposed in graphs within the *Appendices*.

As reported by Antonio Giangrande (2020) in his self-published book *L'Italia Allo Specchio Il DNA Degli Italiani Anno 2020 Lo Spettacolo e Lo Sport Terza Parte*, the general opinion over the insertion of the VAR in the football world, it is not yet well defined, generating many conflicting debates and assumptions about its efficiency. Furthermore, changes or new technology's introduction in a sport, can influence the style of the game as well as can affect its performance's approach. Therefore, criticism among people may arise (Dyer, 2015). In agreement with these studies, a research aiming to precisely develop their theories, was accomplished. The findings suggested that a significant number of complaints and accusations, supported by several members who constituent and belong to the Italian football industry, were

generated. The main criticism resulted to concern the VAR' standard of interpretation and judgment to review an episode occurred during a football game. As a consequence, the main problem which initiated various debates was due to an unclear and imprecise description of one VAR process. The general confusion has emerged regarding the first principle stated in the "VAR Protocol" (2019), where it is explained the use of the VARs based on a number of principles. The controversies are related to defining the term *clear error* or *obvious mistake*. Although the effort of IFAB (2019) to provide categories of decision/incidents which may be reviewed through the VAR, the explanation of these terms still remain vague, since human interpretation in decision making might be reputed according to personal judgements (Arastey, 2019). As a result, Giangrande and Dyer's beliefs were confirmed. The complexity generated after the insertion of a revolutionary technology in a sport such as football has caused many polemics from its very first game in the 2017/2018 season in the Serie A.

Last but not least, the purpose of the final part of the study was to examine how the proposal of a new VAR approach may be implemented or adopted by the Italian league during the following seasons. The new concept consists of an innovative reform which empowers teams to ask for a review, when a possible offence has been ignored by the referee and the VAR combined. This concept is denominated as *VAR challenge* and, if approved by IFAB in the upcoming months, it is destined to modify the protocol as well as the football style of the game in future.

Limitations

In regards to the limitations of the current research, some aspects should be highlighted. Garicano (2005) demonstrates how professional football referees are inclined to favor home teams with the purpose of satisfying the crowds in the stadium. Finding that match officials consistently benefit teams that were hosting the football game by giving less injury time when the game is close and where the host club is leading the result, and tend to add more injury time in close matches where the host club is losing. In addition to this, the study conducted by Lago-Peñas indicates that the greater the score difference between clubs, the less injury time was added by the match official. As a consequence, these elements should be taken into consideration, as well as the strength of football clubs should be considered in future studies. In order to determine if the findings of this research about the effects of the VAR in elite football may be generalized in other countries, further studies are necessary. Furthermore, as the implementation of the VAR by the Serie A only occurred in season 2017/18, the data of the sample was limited to just the two following seasons. Therefore, further analysis should follow in conjunction with its use over the years, generating more data to be later evaluated. Last but not least, the new VAR challenge is a concept which has only recently emerged, therefore there was a lack of previous research studies on this topic.

Conclusion

Initially, three hypotheses were listed as a prediction or assumption of what I expected the most relevant outcomes to be. As a result, (i) both effective playing-time and injury time variables have increased. However, although the games have become longer, the VAR did not significantly affect the game time, as the actual time went up by only 43 seconds in relation to previous season 2016/17; (ii) the game did not become more “aggressive” in terms of yellow and red cards awarded, on the other hand there as been a decrease in the number of red cards awarded in relation to the season 2016/17 (by -5.21% in season 2017/18 and by -8.33% in season 2018/19). The number of yellow cards has also dropped in relation to the season 2016/17 (by -12.27% in season 2017/18 and by -2.73% in season 2018/19); (iii) the implementation of the VAR showed a noteworthy decline in terms of offside calls as well as fouls awarded, however no remarkable difference in terms of goals, or penalties conceded has been revealed. Furthermore, both protests and simulations have suffered a significant drop, corresponding to -17,5% and -35.3%, significant in that it directly positively impacts the integrity and ethical impression of the game viewed across the world by millions of children, suggesting a cleaner and more honest game. Overall, the VAR did not have a dramatic statistical impact on the Italian league, and consequently did not modify the game.

In conclusion, as the VAR in football demonstrates, technology will never replace human being’s work in some areas; but if utilised correctly, helps diminutive the margin of human error in making decisions. As a result of this study, findings advice that the “VAR Protocol”I could be revised in order to increase the efficiency of his intent, i.e. to ensure that no clearly wrong decisions are made in conjunction with incidents occurred during a football game.

Recommendations

1. Referees should avoid emotional feelings, when interpreting video reviews provided from VAR.
2. IFAB should review and adjust the “VAR Protocol”related to principle number 1.
3. The “VAR Protocol” should be renowned around a challenge system
4. Introduce a time limit on VAR calls.
5. Create a database to practice with video footages, aiming to get uniformity between the referee and the VAR.
6. Referee associations should be informed of these results (favoritism and prejudice of referees), in order to create appropriate training methodologies to better handle the prejudices of the community: so that to have a better knowledge of interacting with the referee without being affected by external distractions. The transparency about the communication between referee's and the VARs must improve, perhaps by broadcasting their interactions to the public.

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Appendices

	Yellow Cards	Y / R Cards	Red Cards	Total Red Cards	Penalties Received	Goals	Fouls	Caught Offside
15/16	1762	80	47	127	118	979	11557	1820
16/17	1625	46	51	97	134	1123	10642	1741
17/18 *	1418	45	46	91	120	1017	9714	1614
18/19	1672	45	43	88	122	1019	10083	1399

* First season in which the VAR was introduced in the Seire A

Table 1. Serie A Statistical Analysis

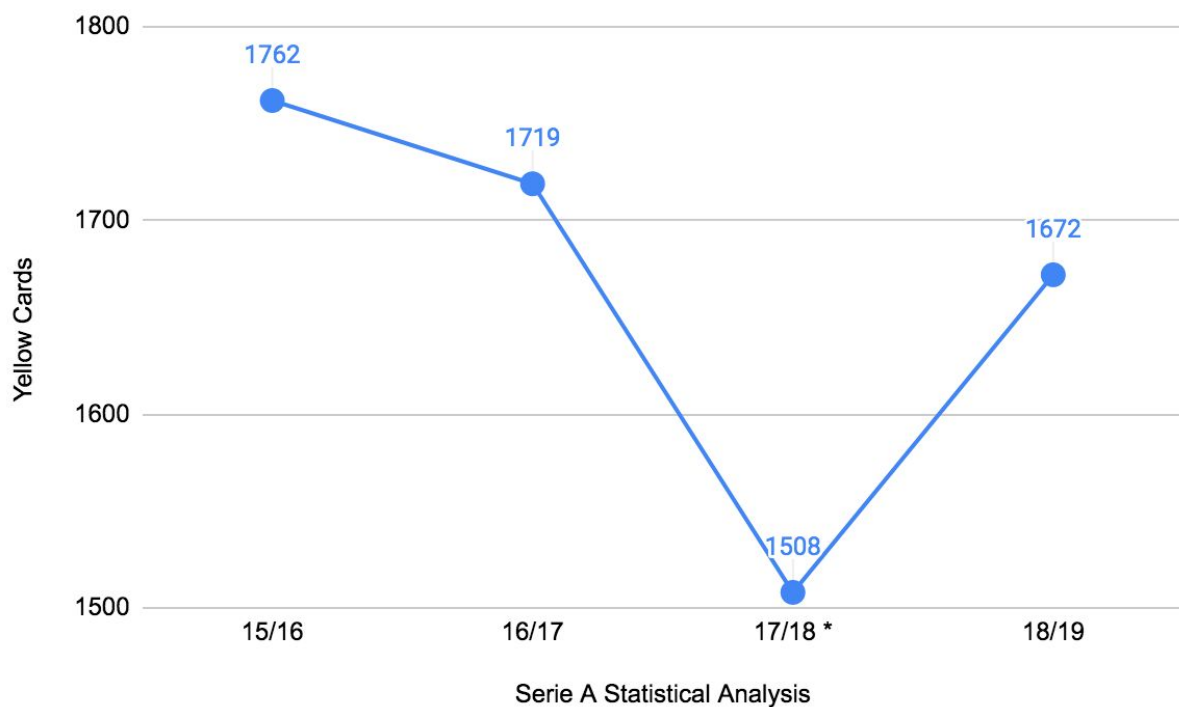


Figure 1. Total number of Yellow Cards awarded from season 2015/16 to season 2018/19 in the Serie A.

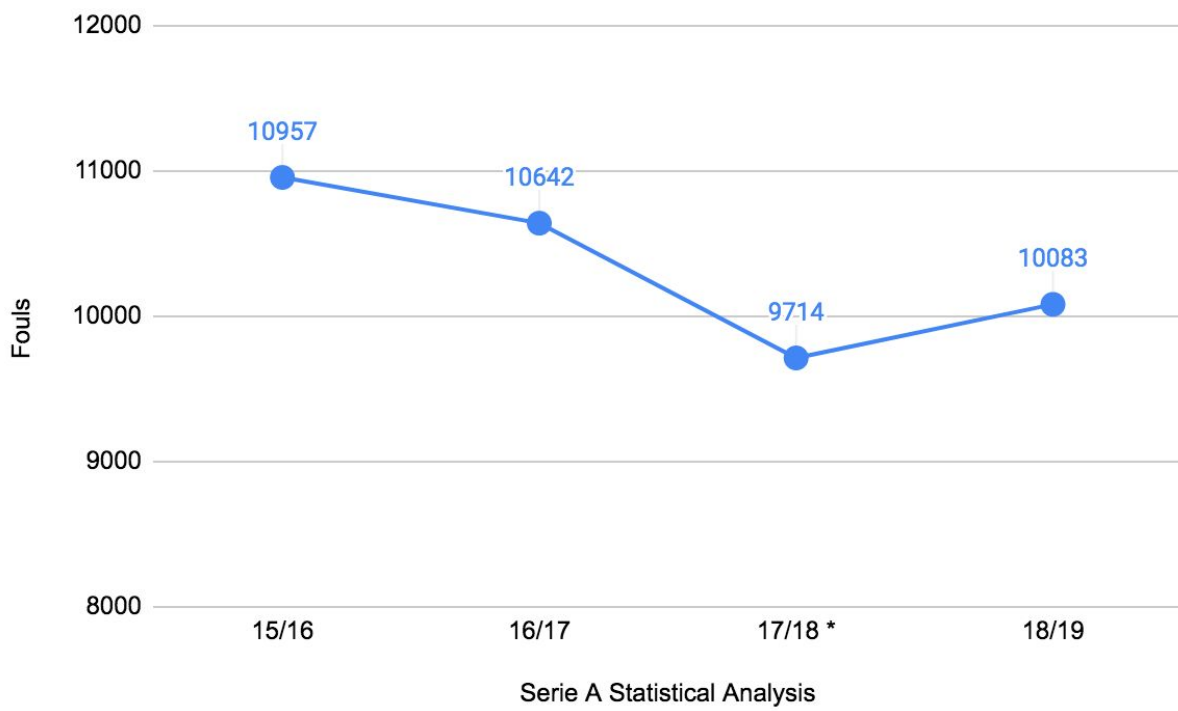


Figure 2. Total number of Fouls awarded from season 2015/16 to season 2018/19 in the Serie A.

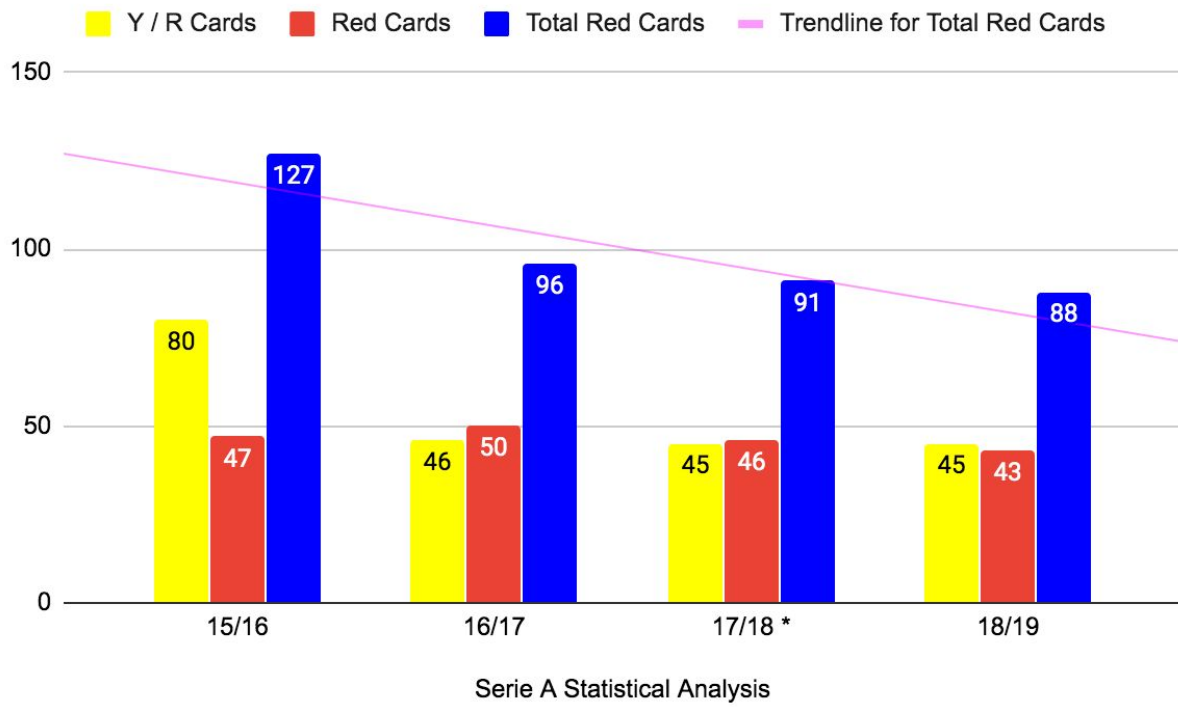


Figure 3. Total number of Red Cards awarded from season 2015/16 to season 2018/19 in the Serie A.

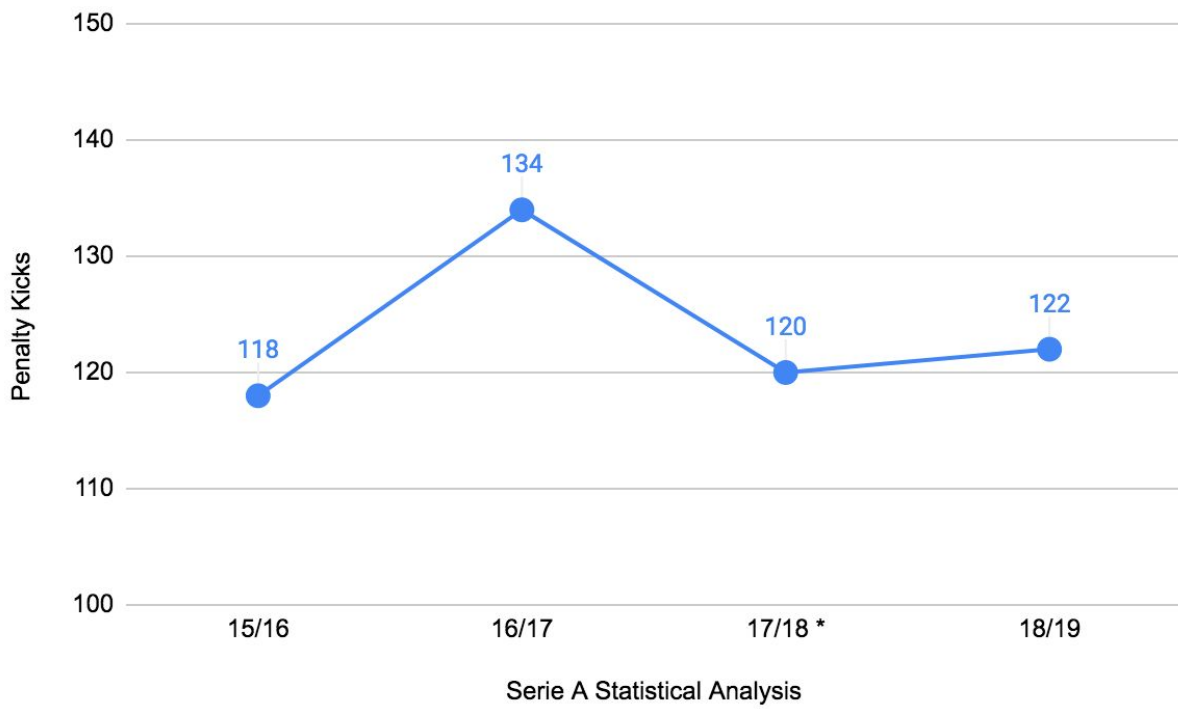


Figure 4. Total number of Penalty Kicks awarded from season 2015/16 to season 2018/19 in the Serie A.

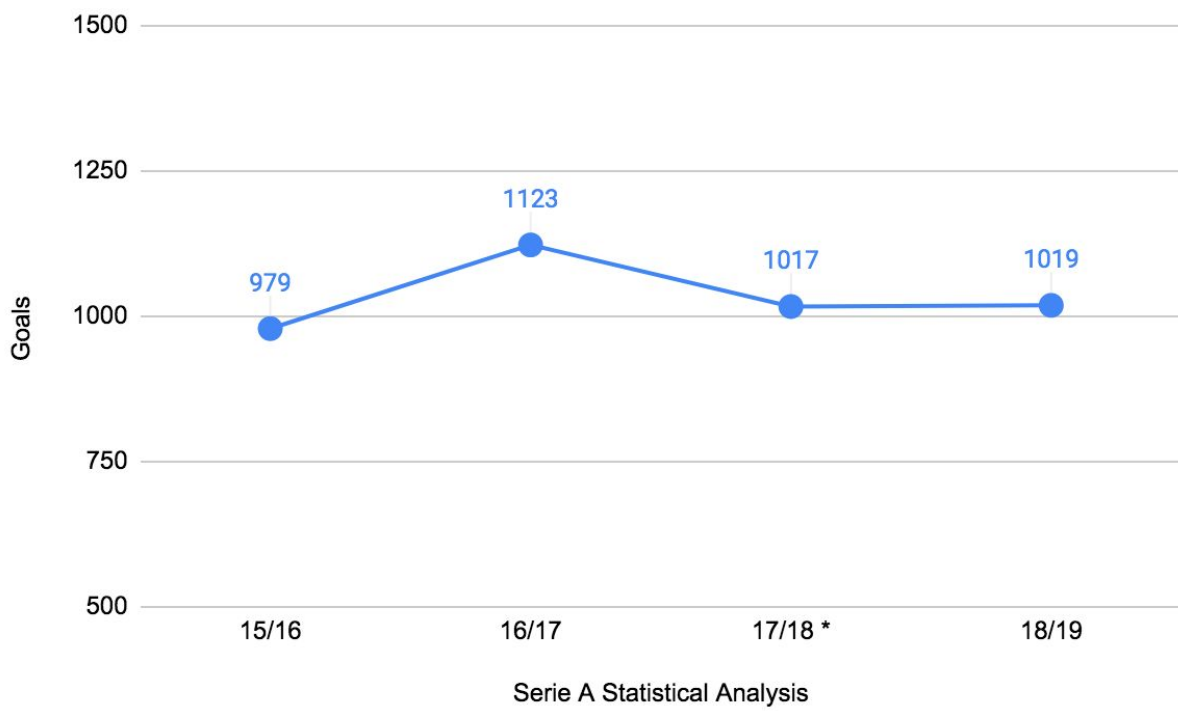


Figure 5. Total number of Goals scored from season 2015/16 to season 2018/19 in the Serie A.

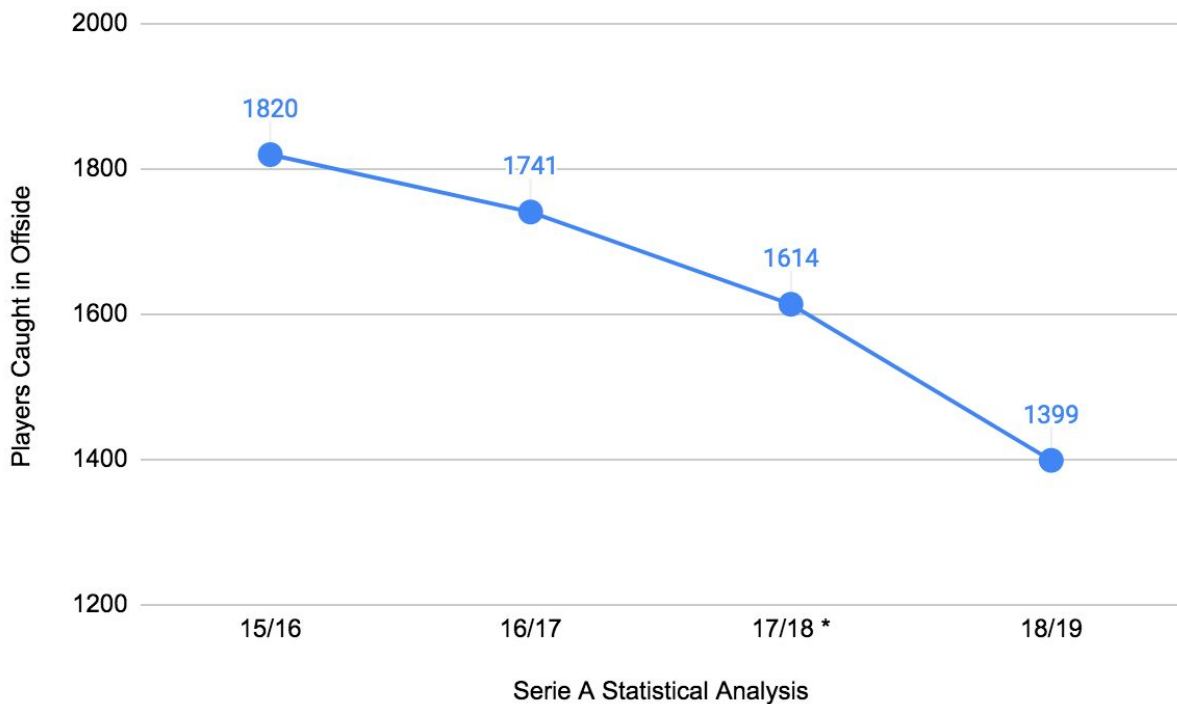


Figure 6. Total number of Players Caught in Offside from season 2015/16 to season 2018/19 in the Serie A.



Review process

The VAR will watch the game on TV screens in the video operation room (VOR) which may be in/near to the stadium or in a more central location (e.g. match centre). For integrity/transparency/credibility, the VAR, assisted by a replay operator (RO), will have independent access to, and replay control of, all broadcast ‘feeds’ so any review uses the same footage as that which may be seen on television.

The VAR will automatically ‘check’ every situation/decision to see if a potential clear error has been made in a match-changing situation or if a serious incident/offence has been missed; there is thus no need for coaches or players to request a review as if something has been missed it will be seen by the VAR.

If no review is needed then communication with the referee is not necessary – this is a ‘silent check’. If a ‘check’ indicates that an incident should be reviewed, the referee should be informed immediately. In addition, if the referee suspects that a major error may have occurred, or something serious has been missed, a review can be requested.

Figure 7. Extract of the “Video assistant referees (VARs) experiment Protocol (Summary)” released by IFAB (2019)

Principles

The use of VARs in football matches is based on a number of principles, all of which must apply in every match using VARs.

1. A video assistant referee (VAR) is a match official, with independent access to match footage, who may assist the referee only in the event of a **'clear and obvious error'** or **'serious missed incident'** in relation to:
 - a. **Goal/no goal**
 - b. **Penalty/no penalty**
 - c. **Direct red card** (not second yellow card/caution)
 - d. **Mistaken identity** (when the referee cautions or sends off the wrong player of the offending team)

Figure 8. Extract of the "VAR Protocol" released by IFAB (2019)

Word count: 14'299