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Application of Big data in Football in Indonesia: Systematic Review

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Abstract

This study's purpose is to review systematically and qualitatively synthesized articles on the application of football sports technology. The research method carried out by conducting an unreasonable search is on research published in the article search period 2017 to 2022 by following prism guidelines; the investigation is carried out by systematically identifying 155 publications that undergo a review of the title, abstract, or full text. Studies are issued if the article is in English or includes the original data. The results of a systematic review found ten articles that met the eligibility criteria, based on self-reported data that in Indonesia, the use of sports technology in Football has yet to be thoroughly used in every aspect of the football organization. There is a need to secure goals related to the use of technology as a whole to advance Indonesian Football. This study concludes that many factors still cause technology and big data to be used thoroughly in Football.

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INTRODUCTION

Sports in the modern era today are undergoing a very remarkable change from the use of technological facilities in every element of achievement sports (Samuel R. et al., 2019; Fältström et al., 2022; Dias de Lacerda et al., 2022). The use of technological facilities that are increasingly changing from those originally used to collect data that are ordinary but are currently used in decision-making and can even provide drama in a match (Wu et al., 2020; Zhou, 2021; Zulkifli & Danis, 2022).

The use of technology in sports has become a necessity at this time because the use of technology is seen as being able to be used in making fair decisions for all parties in a match (Meng et al., 2020; Noll et al., 2022; Baerg, 2017). For example, Video Assistant Referee (VAR) is used in the sport of

Football, where its use provides a very significant change (Malone et al., 2017). For example, decision-making carried out by referees sometimes often occurs human errors where the referee often makes the wrong decision due to obstructed visibility, improper position of the referee, and other psychological factors; this can result in referee errors in taking propriety on the field but with the use of Video Assistant Referee technology becomes the right solution.

The use of Video Assistant Referee (VAR) is not only used in Football but also used in other sports. What distinguishes it is the way VAR works, data collection techniques, and different names in each sport, but in essence, it is so that the referee can see clearly and in detail the moments missed by the referee's eyes (Meng et al., 2020). In badminton, tips on getting to know the Hawk Eye where the method of use is similar to VAR, which is used to ensure the shuttlecock is in or out so that it can be used in accurate decision-making (Dias de Lacerda et al., 2022). The use of technology in sports makes it easier for humans to process the data obtained to make accurate decisions.

Using technology as a suggestion to support sports has been carried out for a long time, but using these data still does not lead to sports science (Fältström et al., 2022). In early 2000, athlete data collection was carried out to benefit policymakers in providing inventions (Liu et al., 2021). In this modern era, all interventions carried out by policymakers are always based on data collected from an athlete, for example, athlete statistics such as the number of achievements, minutes competed, and selection of athlete specialties correctly and can predict athletes' careers through the use of sports science-based technology.

Athlete data is important safe data because opponents can use it to decide in what way and what techniques to train their athletes (Zulkifli & Danis, 2022). In Football, the use of athlete data is very confidential data such as athlete biomotor data (Frevel et al., 2022). Athlete biomotor data is usually used as club consumption to see training progress for athletes, so the data cannot be used for public consumption because other clubs can use the data to see the readiness of other clubs (Wright et al., 2016). However, the integrated data can provide a clear picture for stakeholders, coaches, and club owners to recruit players.

In Indonesia, in this case, PSSI has yet to use technology in the competitions it manages fully. For example, League 1 and League 2 contestants do not all clubs use GPS Sport Vest as a tool for coaches to see the athlete's ability both in training and in playing (Baerg, 2017). Even though GPS Sport Vest is a development of sports science to find out the abilities of athletes in real-time, either in a match or training, the use of GPS Sport Vest is not only to provide an accurate picture of the athlete's performance in the field but also to provide the right decisions for coaches in accompanying a club. This is a challenge for professional clubs to build a Tough club based

on the application of sports science(Malone et al., 2017).

In addition to the uneven use of GPS Sports Vests due to the different financial capabilities of clubs, the disclosure of information related to football athletes is also minimal (Nicholls et al., 2019). For example, player statistical data information is not available by PSSI, PT LIB, or private parties located in Indonesia. However, the data source data is taken from foreign websites such as market transfers.

Therefore, this systematic boxing aims to identify the use of big data in the sport of Football and its effectiveness in decision-making.

METHODS

The method in this study is a literature study (Ramadan & Juniarti, 2020), where the strategy used is a search for literature obtained through database searches of national and international journals. National and international journal providers can be accessed in review article searches using search databases from Google Scholar, Pubmed, and Scopus, using the search term "Big data, Technology in sports." The article search period is from 2017 to 2022. This study used inclusion criteria for ten bibliographies. At the initial stage, researchers identified the first item with 155 articles on Google Scholar, 45 on Pubmed, and 20 on Scopus.

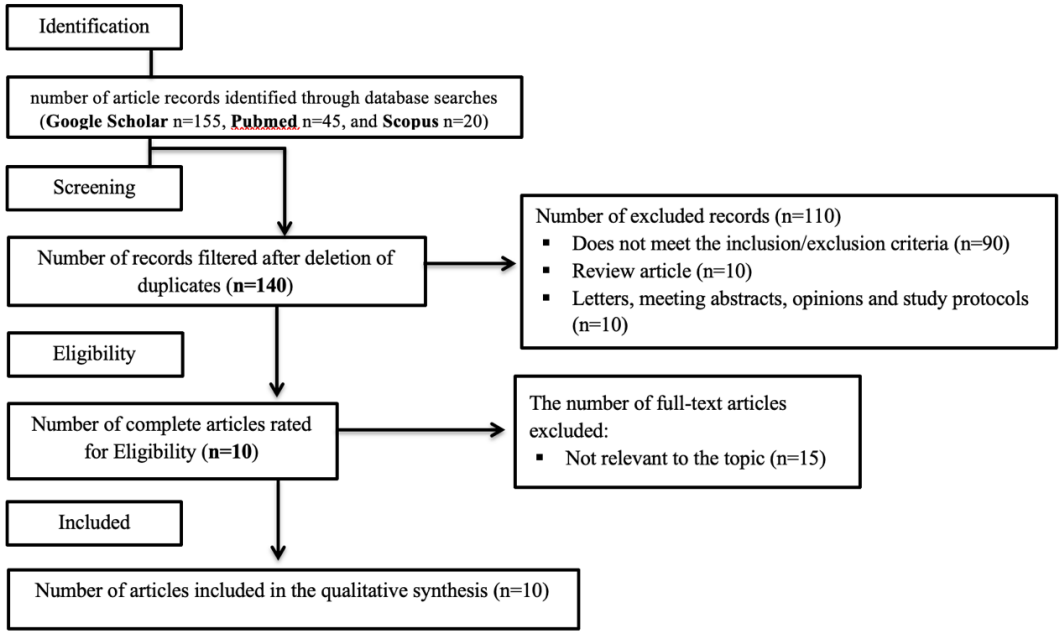
Furthermore, the articles were selected into 45 international articles. The appropriate and required selection results are 10 International Journal articles. Data collection for literature studies was carried out using a search tool database to search for literature sources. This systematic literature review is based exclusively on publicly available literature. Thus, no ethics committee review is required. We conducted this review guided by the principles of Selected Reporting Items for Systematic review and meta-analyses (PRISMA) (Liberati et al., 2009) and related updates (Moher et al., 2015). The research is carried out by analyzing journal articles and then making summaries related to the questions and research objectives. The procedure for finding journals to be material in this study is to have criteria according to the PICOT procedure.

Figure 1 shows the flowchart of the article to be reviewed. Researchers use a database of international journal providers through the Scopus, Pubmed, and Google Schooler websites. The questions that researchers use to conduct and retrieve journal articles as research data are processed according to PICOT and terms used in journal article searches and using Boolean Operators. Researchers wrote keywords with Boolean Operators, namely "Big data" and "Technology in sports."

In searches conducted through Boolean Operators with the keywords "Big data," "technology in sports," and "Football" on the website, ten findings were obtained, with search data from 2015 to 2022. Furthermore, the data obtained is excluded according to the

researcher's needs to obtain 2 data articles. The questions used for the journal review have been adjusted to the PICOT method. Each question has P = problem/population. In this study, the authors used the Application of Big data as a problem. I/E = implementation/intervention/exposure, the authors examine what happens to the application of Biodata in the sport of Football. C = control/comparative intervention; the authors did not use comparative or control intervention in the study. T = time, the author conducted a journal article review study for two months.

Figure 1 Flowchart of Articles being considered for inclusion



FINDINGS AND DISCUSSION

Findings

Figure 1 shows the flowchart of the research we are going to review. We identified 1 5 5 articles from a search on Google Scholar, 45 articles from PubMed, and 20 from Scopus from a reference search. There are 140 unique articles after their duplicates were removed. We have excluded 110 articles in the screening stage after we have reviewed the title and abstract of the article we are reviewing. The average article is ineligible because it has no physical activity assessment or physical activity study during the pandemic. After assessing the full-text article, research irrelevant to the topic (n=15) is issued, and ten research topics are included.

Table 1 Study Characteristics

No	Author, Years	Research Findings
1	(Wu et al., 2020)	The use of technology, especially the use of Big data of football players, can provide clear information on who plays a role in a game; in this study, we can conclude that AMC players are the most critical node in every game, but it all depends on the formation and playing style of a club.
2	(Samuel R. et al., 2019)	Big data is used as a tool to collect information related to events between players vs. players, players vs. referees, spectators vs. spectators, etc. all information is collected in the form of video clips and used as match evaluation material so that the quality of the match is better.
3	(Meng et al., 2020)	Football player information submitted in real-time is valuable information to provide decisions by current conditions. GPS (Global Positioning System) that uses football players requires a considerable cost. However, the development of the YOLOv2 (You Only Look Once version 2) algorithm and improved KCF (Kernelized Correlation Filter) method makes the reasoning cost much cheaper than the use of GPS used by players.
4	(Zhao & Dong, 2022)	The use of video analysis in Football clearly shows that an attack begins based on the player's position while on the field.
5	(Baerg, 2017)	Using big data in player selection is an effective solution for selecting outstanding athletes based on statistical data owned by athletes.
6	(Malone et al., 2017)	The device provides large amounts of data to inform decision-making about athletes' training and performance.
7	(Nicholls et al., 2019)	The findings have begun to illustrate practice in elite sports while highlighting the importance and need for further practitioner-based inquiry regarding performance analysis and feedback in applied contexts.
8	(Rein & Memmert, 2016)	Big Data and technology can help address issues for coaches and technical directors and help develop theoretical models for tactical decision-making in sports teams.
9	(Putranto et al., 2023)	Virtual Reality (VR) has been implemented in sports education and training today. This can significantly contribute to and improve decision-

		making for athletes about the conditions that may be encountered, such as predictions.
10	(Frevel et al., 2022)	With the use of the SportsTech Matrix for athletes, experts anticipate technology to play a significant role in improving their sporting performance.

Discussion

From the systematic reviews that we have done, it can be seen that the studies that have been evaluated are related to the use of big data in Football after carrying out a series of activities such as collecting articles and separating several articles to be studied, in the end, we review articles from 10 articles that are evaluated.

Furthermore, several studies that have been carried out show that the use of technology in Football has a very close role in the current 5.0 era (Putranto et al., 2023: Baerg, 2017). This certainly has a direct impact on the way policymakers make decisions in every aspect of the sport of Football, the direct impact felt from using sports technology such as Referees, Coaches, and Clubs (Frevel et al., 2022). Meanwhile, the association's use of technology has a tremendous impact on improving the quality of the league being implemented.

The use of Video Assistant Referee (VAR) in matches gives in the league helps referees provide objective decisions to both teams; the use of Video Assistant Referee (VAR) in Indonesia has not been implemented in the implementation of Liga 1 Indonesia this is because many factors result in the use of Video Assistant Referee (VAR) cannot be implemented such as costs, technology and human resources (Nicholls et al., 2019; Rein & Memmert, 2016). The application of VAR in an official competition of a country is not a joint work within the organization because the costs that need to be incurred are not small, and even the quality of the stadium is the basis for the application of VAR in a league.

The application of technology in Indonesian Football has been carried out for a long time. However, sometimes this technology needs to be updated, like in developed countries in football sports such as England with the English league, Italy with the Seria A league. which has long been used by other developing countries. In contrast, in Indonesia, the use of the Global Positioning System (GPS) has only been used by league 1 participants as a whole since 2021, where it is pretty slow for countries that want to improve the quality and achievements of their Football (Meng et al., 2020).

Thus the use of technology in its development must be a goal of Indonesian Football in improving the quality and achievements of football sports. This is supported by all stakeholders in uniting common goals. In addition, self-reported actions are used in most of the included studies. Thus, measurement errors are a concern and can result in overestimates.

Although the number of participants included in the study who qualified for this systematic review was large (4,288 papers to 10 studies), most of all papers were from the same study.

CONCLUSION

Several studies have been evaluated to assess the use of sports technology in Indonesian Football. A quarter of the articles evaluated need to meet the recommendations for using sports technology that is not relevant in Indonesia. Many factors cause technology in Football not to be used thoroughly, such as facilities, human resources, and finance. They are considering that sports technology in Football is a long-term investment in building Indonesian Football, starting from coaching to entering the achievement phase.

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