



## *RESEARCH ARTICLE*

### **HARNESSING DIGITAL SOLUTIONS FOR GAMES REFEREEING IN NIGERIA:**

#### **AN IN-DEPTH STUDY**

**Abubakar Sadiq IBRAHIM, Hakeem Adewale SULAIMON**

Department of Computer Science, Federal University of Education Zaria, Kaduna State

### **ABSTRACT**

This study examines the integration of digital solutions in sports refereeing within Nigeria, addressing the gap in technological adoption in the country's sports ecosystem. Using a descriptive survey methodology, data was collected from 726 sports administrators across Nigeria. Findings reveal a significant deficiency in the accessibility of essential digital officiating tools, emphasizing the urgent need for technological integration to enhance efficiency. Despite challenges, a strong correlation exists between the availability and effective use of digital technologies, underscoring their critical role in improving officiating standards. The study highlights the transformative potential of digital solutions in refining athlete performance and officiating protocols. Recommendations include increased investment, capacity-building initiatives, public-private partnerships, and proactive promotion of digital adoption to advance sports development in Nigeria.

**Keywords:** Digital solutions, sports, refereeing, integration, officiating

### *Corresponding Author*

Abubakar S. IBRAHIM

Email Addresses: [abusadiq365@gmail.com](mailto:abusadiq365@gmail.com) & [sulaimonha@gmail.com](mailto:sulaimonha@gmail.com)

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## **1.0. INTRODUCTION**

Sports have been an integral part of human civilization, evolving from ancient competitions to modern global events. Today, sports encompass a wide range of activities, from team-based games like football and basketball to individual disciplines such as athletics and tennis (Wuest & Bucher, 2006). Nowadays, sports cover a wide range of organized activities, from team games like football and basketball to individual sports such as athletics and tennis. Regardless of the specific sport, the essence remains the same: athletes strive to excel and push the limits of human ability, captivating audiences worldwide (Abernethy, 2003). Refereeing plays a crucial role in ensuring fair plays and maintaining the credibility of sports competitions.

Central to the integrity of these competitions is refereeing, which ensures fair play, upholds rules, and maintains credibility (Aribamikan, 2015). Referees serve as impartial arbiters, influencing match outcomes and fostering sportsmanship (Dominic et al., 2014). Additionally, referees mediate disputes on the field, preserving the competitive spirit and promoting fairness among participants (Nhamo & Magonde, 2013). In essence, the role of refereeing in sports cannot be overstated, as it forms the foundation of sportsmanship, fair play, and the overall integrity of sporting competitions (Aribamikan et al., 2018).

In the realm of sports, the advent of digital solutions has brought about significant changes, revolutionizing how games are officiated and managed. Digital solutions, encompassing various technological devices capable of processing and transmitting data, have permeated modern society, offering transformative potential across different sectors, including sports officiating and management (Oyeniyi, 2012). The promise of digital solutions lies in their ability to enhance the efficiency and effectiveness of judging athletes' performances and managing sporting events (Meghe, 2000). By harnessing digital tools, race officials could streamline race management processes, mitigate the risk of technical failures, and enhance the overall experience for athletes and spectators alike (Aribamikan et al., 2019).

Whether through advanced timing systems, real-time data analytics, or innovative communication platforms, digital solutions hold the key to ushering in a new era of reliability and precision in athletics (Bamitale & Aribamikan, 2019). One notable application of digital solutions in officiating is through the use of electronic scoreboards, which not only showcase



athletes' performances but also provide real-time guidance to athletes, coaches, and officials (Aribamikan, 2007). This technological tool enables immediate feedback, allowing stakeholders to witness performances as they unfold and aiding officials in making informed decisions. Additionally, audio-visual mediums such as television, radio, and video recordings play a significant role in instructing officials (Adeyanju, 2002). By recording matches or events, officials can later review and analyze their decisions, thereby improving the quality of officiating by minimizing errors.

Furthermore, innovations like the use of earphones and radio sets during football matches, introduced during the 2006 FIFA World Cup in Germany, enable effective communication between referees and their assistants during gameplay, reducing the likelihood of incorrect calls and ensuring fairness in decision-making. Technologies like goal-line technology and the Video Assistant Referee (VAR) system further enhance officiating standards by providing clear verdicts on crucial decisions such as goal validations, penalty calls, and disciplinary actions. In sports such as Handball, Volleyball, Basketball, and Cricket, various digital solutions such as spider cams, overhead cams, video replays, and decision referral systems are employed to aid officials in making accurate judgments. Additionally, advancements in electronic equipment, including stopwatches, starting blocks, score timing scoreboards, and photo finish equipment, have revolutionized the precision of timing and measurement in athletics events (Aribamikan *et al.*, 2019).

## **2.0. Problem Statement**

The surge of globalization in the sports arena has underscored the significance of digital solutions in enhancing various facets of sports, including player performance and officiating. However, a notable gap exists in Nigeria concerning the integration of digital solutions in sports refereeing. Despite these advancements, Nigeria lags in adopting digital refereeing tools compared to developed nations (Chukwudo *et al.*, 2023). The absence of digital solutions integration within the National Sports Federations (NSFs) and State Sports Councils, coupled with underutilization of digital technologies by the Athletics Federation of Nigeria (AFN) and State Sports Councils (Uzoamaka *et al.*, 2019).



Globalization has heightened the importance of digital solutions in sports, yet Nigeria faces significant challenges in their adoption. Key issues include: a) Limited access to essential tools like Video Assistant Referee (VAR) and referee communication systems b) Inadequate infrastructure hindering effective implementation. While the Athletics Federation of Nigeria (AFN) demonstrates some usage of digital solutions in refereeing, the lack of equipment at the state level further impedes progress (Olaoye et al., 2017).

### **2.1. Aim and Objectives**

The aim of this study is evaluate the accessibility and application of digital solutions in Nigerian sports refereeing, aiming to bridge the technological gap. To actualize the aim, the following specific objectives were investigated:

1. To determine whether digital solutions such as ICT equipment are accessible and utilized for sports officiating in Nigeria.
2. To examine the relationship between the availability and effective use of digital solutions in sports refereeing in Nigeria.

### **2.2. Research Questions**

- a) Are digital solutions (e.g., ICT equipment) accessible and utilized for sports officiating in Nigeria?
- b) What is the relationship between the availability and effective use of digital solutions in sports refereeing?

### **2.3. Hypothesis**

**H<sub>0</sub>** : There is no significant relationship between the accessibility and application of digital solutions in Nigerian sports refereeing.

## **3.0. METHODS**

The study employed a descriptive survey design, which aimed to obtain information from a representative sample of the population to accurately describe existing situations. Data were collected from 726 sports administrators across Nigeria's 36 states (including Abuja). A



purposive sampling technique selected respondents, and a validated Sports Refereeing Questionnaire (SRQ) was administered. The instrument comprised two sections: the first focusing on socio-demographic variables of respondents, and the second eliciting responses related to the study's variables. To ensure content validity of the instrument, the researcher sought the assistance and guidance of six experts, three each in the field of Sports Administration and in ICT. Additionally, a pilot study was conducted using the test-retest method to determine the questionnaire's reliability and appropriateness to the Nigerian environment.

In this pilot test, the questionnaire was administered to sixteen (16) staff of Kaduna State Sports Ministry, at two-week intervals, and the scores from the two sets of responses were correlated using Cronbach's alpha. Reliability was confirmed via Cronbach's alpha ( $\alpha = 0.84$ ). Data analysis included: descriptive statistics (percentages, mean scores) and inferential statistics (Pearson Correlation). The study's hypotheses were tested at a significance level of  $\alpha = 0.05$  ( $P < 0.05$ ).

## **4.0. PRESENTATION OF RESULTS AND DISCUSSIONS**

### **4.1. Presentations of Results**

**Research Question 1:** Are digital solutions (e.g., ICT equipment) accessible and utilized for sports officiating in Nigeria?

Table 1 presents an evaluation of digital solutions utilized for sports refereeing in Nigeria. The findings reveal that, using a criterion mean score of 2.50 as the benchmark for assessment, the majority of items scored below this threshold. However, notable exceptions include the Digital Score Display, Online Connectivity Services, Automated Audio System/Starting Signal for Track and Field in athletics, Precision Finish Line Camera System for athletics, and Game Time Tracker for Basketball, each scoring above 2.50. These five items collectively represent 31.3% of the total, indicating a moderate level of accessibility of digital solutions for sports officiating in Nigeria.



Table 1: Accessibility of Digital Solutions for Sports Refereeing in Nigeria

S/N	ICT Facilities	Adequate	Fairly Adequate	Inadequate	None	Mean	SD
1	Precision Finish Line Camera System	202	203	195	126	2.66	1.062
2	Referee Communication Device	179	158	230	159	2.49	1.088
3	Game Time Tracker for Basketball	188	206	198	134	2.62	1.061
4	Online Connectivity Services	226	221	190	89	2.80	1.013
5	Review Umpire with TV Replay Access in Cricket	164	129	208	225	2.32	1.136
6	Aerial Cameras for Handball Coverage	173	164	183	206	2.42	1.135
7	Tennis Court Monitoring System	152	153	177	244	2.29	1.140
8	Enhanced Video Analysis Tools for Volleyball	145	151	204	226	2.30	1.110
9	Big Screens for Performance Display and Results Presentation	167	157	253	149	2.47	1.059
10	Digital Score Display	276	158	197	95	2.85	1.074
11	Umpire Decision Review System in Cricket	143	145	203	235	2.27	1.114
12	Automated Audio System/Starting Signal	213	235	200	78	2.80	0.980
13	Computerized Scoring Devices for Boxing Matches	161	156	215	194	2.39	1.104
14	Instant Playback System for Basketball	167	161	179	219	2.38	1.141
15	Automated Goal Detection System	170	168	209	196	2.48	1.072
16	Video Review System for Football	153	168	209	156	2.38	1.095

Criterion mean = 2.50.

Source: Author's Analysis (2025).

A further the comparative analysis of the results in Table 1 reveal that the digital score display emerges as the most accessible with a mean score of 2.85. This is closely followed by the automated audio system/starting signal for track and field in athletics with a mean of 2.80, online connectivity services with a mean of 2.80, and precision finish line camera system for athletics with a mean of 2.66. Conversely, the umpire decision review system in cricket records the lowest mean score of 2.27, indicating relatively limited accessibility. These findings underscore the challenges associated with the availability of digital solutions for sports officiating across various games in Nigeria.





**Research Question 2:** What is the relationship between the availability and effective use of digital solutions in sports refereeing?

Table 2 present the correlation between the presence and adoption of digital solutions for sports refereeing in Nigeria. The findings reveal that all items exceeded the threshold with mean scores above 2.50, indicating a discernible relationship between the presence and adoption of digital solutions for sports refereeing in Nigeria.

**Table 2:** Correlation between the Accessibility and Application of Digital Solutions for Sports Refereeing in Nigeria.

S/N	ITEMS	SA	A	D	SD	MEAN	STANDARD DEV.	RATING
1	Broadcasting competition results globally	271	322	81	52	3.12	.871	3rd
2	Guaranteeing the fairness of officials	290	295	75	66	3.11	.924	5th
3	Enhancing athlete performance	220	307	119	80	2.92	.950	6th
4	Assessing athlete performance	340	288	53	45	3.27	.847	1st
5	Establishing competition victors	280	325	67	54	3.14	.869	2nd
6	Verifying the precision of officials	274	317	73	62	3.11	.900	4th

Criterion mean = 2.50. Source: Author's Analysis (2025).

### Hypothesis

There will be no substantial correlation between the accessibility and application of digital solutions for officiating games in Nigeria.

**Table 3:** Pearson Correlation of accessibility and application of digital solutions for games

Variable	N	Mean	SD	r	P
Accessibility of digital solutions	726	39.93	12.86	0.664	0.000
Application of digital solutions	726	18.67	4.26		

p<0.05. Source: Author's Analysis (2025).

Table 3 revealed a **moderate positive correlation** ( $r = 0.664$ ,  $p < 0.05$ ), rejecting the null hypothesis. Greater accessibility correlated with higher utilization. Consequently, the null hypothesis is rejected. The observed relationship, of moderate nature, demonstrates a positive direction, indicating that higher accessibility of digital solutions correlates with increased applications for refereeing games purposes.



#### **4.2. Discussions of Findings**

The findings of the first research question revealed limited accessibility of essential digital solutions equipment for games officiating in Nigeria. Among the examined items, only The Game Time Tracker for Basketball, Online Connectivity Services, Digital Score Display, Automated Audio System/Starting Signal for Track and Field, Computerized Scoring Devices for Boxing Matches, and Automated Goal Detection System were found to be accessible. Conversely, essential equipment like Aerial Cameras for Handball Coverage, Video Review System for Football, Instant Playback System for Basketball, Review Umpire with TV Replay Access in Cricket, Tennis Court Monitoring System, Enhanced Video Analysis Tools for Volleyball, Referee Communication Device, Umpire Decision Review System in Cricket, and Big Screens for Performance Display and Results Presentation were deemed unavailable.

The result aligns with existing literature, as highlighted by Bamitale & Aribamikan, (2019) who emphasize the inadequacy of digital solutions in Nigerian games administration. This underscores the importance of implementing digital solutions to streamline sports officiating procedures and disseminate official competition outcomes globally, as advocated by Berry & Abernethy, (2003). Additionally, recent studies by Adebayo et al., (2022) underscore the potential of digital solutions in enhancing athletes' performance by elevating officiating standards. These combined findings advocate for investment and integration of digital solutions in sports administration to improve the efficiency and effectiveness of managing sporting events in Nigeria.

Research question two and the hypothesis findings indicated that accessibility plays a crucial role in improving the utilization of digital technologies for overseeing games in Nigeria. Survey participants concurred that integrating digital solutions into refereeing ensures the impartiality and accuracy of officials, boosts athlete performance, determines competition winners, and disseminates competition outcomes worldwide. These results align with those of Abdullah (2019), who identified a noteworthy correlation between the availability and utilization of digital solutions in sports management.





The integration of digital solutions has become increasingly prevalent within professional sports leagues across the United States, revolutionizing the landscape of sports officiating, as documented by Schaefer & Felkay (2022). In contrast, within Nigeria, there is a growing acknowledgment of the imperative need to incorporate digital solutions equipment to elevate domestic sports officiating standards, as emphasized by Chukwudo *et al.* (2023). The effective utilization of digital solutions has played a pivotal role in enhancing performance standards in sports officiating, particularly evident in more developed nations, highlighting Nigeria's relative underutilization of such technological advancements, as documented by Dominic *et al.*, (2014). This underscores a significant opportunity for Nigeria to enhance efficiency in sports officiating through the provision, accessibility, and proficient use of digital solutions, thereby advancing sports development within the country.

Realizing the potential benefits of digital solutions in sports officiating necessitates that officials possess the requisite knowledge and proficiency in operating the equipment. Research by Adebayo *et al.*, (2022) indicates that knowledge is a critical factor influencing the adoption of digital solutions among sports managers in Nigeria. Therefore, it is essential for educators, coaches, athletes, sports administrators, and officials to remain abreast of the latest advancements in digital solutions usage within sports to optimize performance and success rates.

The media plays an essential role in disseminating information regarding new equipment and officiating methodologies through various platforms such as television, online channels, and live broadcasts, providing analyses to aid spectators and viewers in comprehending officials' decisions, as emphasized by Abdullah, (2019). Moreover, the internet serves as a valuable repository for accessing relevant rules, regulations, and updates on sporting events. Importantly, it facilitates seamless global communication among officials, fostering the exchange of ideas and information, as highlighted by Schaefer & Felkay, (2022).

## **5.0. CONCLUSION AND RECOMMENDATIONS**



### **5.1. Conclusion**

Nigeria's sports sector stands to gain significantly from digital solutions, yet accessibility remains a major hurdle. Addressing this gap through strategic investments, training, and partnerships will elevate officiating standards, aligning Nigeria with global best practices. This underscores the pressing need for Nigeria to bolster its efforts in integrating digital solutions into sports officiating to align with global standards and enhance efficiency. The study emphasized the importance of applying digital facilities to streamline sports officiating procedures and globally disseminate official competition outcomes. It echoed existing literature, which underscores the potential of digital devices in enhancing athletes' performance by elevating officiating standards. Additionally, the research revealed a significant correlation between the availability and utilization of digital technologies for overseeing games in Nigeria. This correlation underscores the importance of ensuring adequate accessibility of digital equipment to enhance the utilization of digital solutions for sports refereeing purposes. It aligns with previous studies, which identified a noteworthy correlation between the availability and utilization of digital solutions in sports management, emphasizing the pivotal role of accessibility in improving officiating practices.

### **5.2. Recommendations**

To improve digital integration in Nigerian sports refereeing, the following strategies are proposed:

1. Prioritize funding for tools like VAR, precision timing systems, and referee communication devices.
2. Conduct workshops to enhance technical proficiency among officials.
3. Collaborate with tech firms to procure and maintain advanced officiating technologies.
4. Launch campaigns to highlight the benefits of digital solutions in sports.
5. Offer tax breaks and branding opportunities to attract private sector investment.



### Competing Interest

The authors have declared that no conflicting interest exist in this manuscript.

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