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Impact of Access Control Device on User Safety in Public Stadiums in South-East and South-South Zones of Nigeria

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Abstract- ***This study forms part of a broader investigation into how access control devices affect user safety in public stadiums within the South-East and South-South zones of Nigeria. It examines four public stadiums sampled from seven stadiums in the study area through stratified random sampling; six of the public stadiums were State owned, while one was Federal Government sponsored. Employing a survey research design, two null hypotheses were developed for the study in response to two research questions: To what extent does the provision of access control device impact on user safety in public stadiums in the study area?; To what extent is there a difference among the public stadiums in the South-East and South-South zones of Nigeria in the provision of access control device for user safety? The study defined sixteen variables, which were directly used to develop the questionnaire serving as the main data collection instrument. A sample size of 385 respondents was determined using Cochran's formula. Cross-tabulation and Spearman Rho product-moment correlation analyses were conducted to test two null hypotheses. Results revealed a Spearman Rho correlation coefficient of 0.701, indicating a strong positive relationship between the access control device located near emergency exit point, and the stadium layout affects crowd flow. The hypothesis test produced a p-value of 0.000, which is significantly lower than the 0.01 significance level, leading to the rejection of the null hypothesis. The findings confirm that access control devices significantly influence user safety, highlighting that efficient operation and timely maintenance are essential for ensuring both perceived and actual safety in public stadiums.***

Indexed Terms- ***Access Control Device, Emergency Exits, Maintenance, Public Stadiums, User Safety***

I. INTRODUCTION

Access control device in stadiums as a phenomenon concerns how the systems obtain, authenticate, and deploy information to make real time decisions about who is authorized to enter secure areas in order to ensure safety (CAME [7]). The basis of the development of access control devices leverages on credential authentication, integrity and precision of the access control technology, and real-time data management to enable the officials respond to fraudulent entry or overcrowding. (Watchers et al. [23]). Buyrukoglu et.al [6] posits that access control devices function as physical and digital barriers, enabling only ticket holders and accredited staff to enter the arenas or restricted areas. Access control devices could identify prohibited individuals who are banned from the arena or have history of security risks, further enhancing safety measures. When an access attempt is denied, the system can automatically prompt security personnel to investigate and make informed response to possible threats. (Hdwr [10]). According to Laughlin [14], access control devices such as turnstiles are important for regulating crowd flow, allowing one entry at a time and minimizing the potentials of congestion.

Stadiums should be designed and operated to manage the flow of crowds during entry, exit, and emergencies to forestall panic and stampedes. Stadium safety is important to protect lives and property from crowd-related incidents, fire hazards, and structural failure. Past historical disasters, such as Hillsborough disaster (Williams, [24]) are reminders of negative outcomes of inadequate safety measures in stadiums.

Public stadiums are vital facilities that serve multiple purposes, including hosting sports competitions, town hall meetings, political rallies, religious crusades, entertainment events, and large-scale government recruitment exercises. Bradbury (2021) highlighted the economic significance of stadiums in urban development, while Akintund [1] noted that poor stadium control and organization hinder the achievement of successful stadium development and operation in Nigeria, and between 1979 and 2017, Nigeria recorded eight major stadium crowd incidents

across various locations, resulting in 53 deaths and over 180 injuries (Nwanguma,[15]).

Literature identifies biometric applications as valuable tools for audience verification and access control in stadiums and other public assembly venues (Jennings et.al.[11]). Biometric technology enables automatic and reliable identification, recognition, surveillance, and security screening. Botchway [5] and Khan et.al.[13] further observed that advancements in biometric systems now allow recognition at a distance and while in motion, enhancing traveler authentication and risk assessment.

Investigating safety and access/egress challenges in stadiums is therefore crucial to ensuring a secure and enjoyable environment for spectators and players.

Screening gaps highlight the need for smarter access control measures and crowd management strategies, particularly during high-density events (Johnnie, et.al[12]. Smart ticketing and navigation technologies also promote seamless entry and exit, improving the overall fan experience. Piethraszewski et.al [16] emphasized that integrating artificial intelligence (AI) and data analytic strengthens stadium operations and crowd behavior prediction, thereby enhancing long-term safety outcomes.

This study forms part of a broader investigation into the impact of access control devices on user safety in public stadiums within Nigeria's South-East and South-South geopolitical zones, and Jennings [11] did not specify procedures for designing or operating access control systems in these facilities, hence, this research aims to contribute to the development of frameworks for the efficient and sustainable design and operation of access control systems in public stadiums across the study area.

1.1 Aim of the Study

The aim of this study is to assess how the provision of access control devices influences user safety in public stadiums across the South-East and South-South geopolitical zones of Nigeria.

1.2 Objectives of the Study

The objectives of the study are to:

1. examine the impact of access control device provision on user safety in public stadiums across the South-East and South-South regions of Nigeria; and to
2. investigate the differences among public stadiums in the South-East and South-South zones of Nigeria regarding the provision of access control devices and their impact on user safety.

1.3 Research Questions

1. To what extent does the provision of access control devices influence user safety in public stadiums across the South-East and South-South zones of Nigeria?
2. To what extent do public stadiums in the South-East and South-South zones of Nigeria differ in the provision of access control devices in ensuring user safety?

1.4 Research Hypotheses

The following hypotheses guided the study:

Hypothesis: H01:

Access control device has no significant impact on user safety in public stadiums in the South-East and South-South zones of Nigeria.

Hypothesis: H02:

There is no significant difference among public stadiums in the study area in the provision of access control device for user safety.

1.5 Significance of Study

During the study period, no standardized procedures existed for ensuring user safety through the design and operation of access control devices in public stadiums within the study areas. This research seeks to contribute to developing frameworks to guide the design and management of such systems across the South-East and South-South zones of Nigeria. In an era marked by mega-events and complex security threats, the study carries both urgency and relevance, offering insights that can help designers and policymakers create stadium environments that are meaningfully secure.

II. LITERATURE REVIEW

Literature indicates that user safety is one of the most critical concerns in large, crowded facilities such as stadiums. Still et.al. [22] identified safety perception

as a key mediator linking service quality, user satisfaction, and behavioral intentions in public assembly spaces like stadiums. According to Sagun et.al [18], safety aims to eliminate hazardous conditions that could result in bodily harm. Sorensen et.al [20] categorized safety into objective and subjective dimensions—the former measuring actual risk levels, while the latter reflects individuals' feelings of safety or insecurity within a space. Alnabulsi and Drury [3] emphasized that ensuring user safety remains a major challenge in large, crowded environments. Bellet et.al.[4] further noted that anxiety triggers in crowded stadiums can induce panic, sometimes leading to catastrophic outcomes. Alkhadim et.al.[2] identified twelve risk constructs of perceived safety and forty-one indicators that can mitigate such risks. The Hillsborough Stadium disaster, as discussed by Williams [24] and Soration (2013), marked a turning point that led to significant safety reforms in UK stadiums (Conn, [8]. Still [21] developed a computational model for crowd behavior, establishing numerical safety standards to predict overcrowding and potential injury risks.

Yusuf et.al.[25] examined stadium security and safety during professional football league matches in ten stadiums using a descriptive survey approach. The study identified variables such as entry and exit systems, CCTV control centres, stewards, and field protection, concluding that safety measures recommended by FIFA and the Green Guide were not implemented. Elendu and Jenewari [9] emphasized that well-designed entry, exit, and emergency routes are crucial to preventing stampedes, recommending that screening points and access control devices be located near security posts but away from main gates to reduce congestion. Shoewu et.al. [19] noted that the operational state of access control devices serves as a key indicator of system safety and reliability, stressing the importance of regular maintenance, inspection, and staff training to ensure proper usage and compliance with security standards.

III. RESEARCH METHODOLOGY

The study was conducted in public stadiums located within the South-East and South-South geopolitical zones of Nigeria, employing quantitative research design techniques. Data were collected through the administration of structured questionnaire to a sampled population. At the time of the research, seven public stadiums existed in the study area, as shown in Table 1, from which four were selected using stratified random sampling. At the first stage of the strata Nnamdi Azikiwe stadium (the only federally funded stadium located in the South-East) was chosen. In the next phase of the stratification, Dan Anyiam stadium Owerri being the only remaining public stadium in the South-East was therefore automatically chosen. Godswill Akpabio stadium Uyo and Yakubu Gowon stadium Port-Harcourt were sampled from the remaining public stadiums in the South-South by balloting in the last phase of the stratified random sampling. The respondents comprised of stadium users, including both staff members and spectators.

To determine the sample size, the Cochran formula for finite population was used:

$$n = \frac{n0}{1 + \frac{n0 - 1}{N}} \quad \text{.....Equation I(Kothari,[17])}$$

Where: $n0$ is Cochran's sample size recommendation
N = Population size n = New adjusted sample size

The sample size was applied to the formula to determine the total population of staff and user respondents. This figure was then proportionally distributed among the selected stadiums based on each stadium's capacity. Consequently, the total number of respondents for the study was determined to be 385. To provide for missing data attrition, 425 questionnaires were distributed in the field, while 385 were returned.

The researchers vouched to protect the rights of respondents, and maintain scientific integrity in the study, and also present the findings objectively.

Table 1: List of Public Stadiums in South-East and South-South Geo-political Zones of Nigeria.

S/N	State	Available Public Stadia
1	Abia	None
2	Anambra	None
3	Akwa Ibom	Godswill Akpabio International Stadium Uyo

4	Bayelsa	None
5	Cross River	U.J. Esuene Stadium, Calabar
6	Delta	None
7	Ebonyi	None
8	Edo	Samuel Ogbemudia Stadium, Benin City
9	Enugu	Nnamdi Azikiwe International Stadium, Enugu
10	Imo	Dan Anyiam Stadium Owerri

Source: Nwanguma(2020)

Data were collected using questionnaires developed through the direct operationalization of Table 2 (Variable Definition), ensuring the study's reliability and validity. Univariate analysis was performed on all variables to generate respondent statistics, including frequency distributions and measures of central tendency. Bivariate analysis was then used to examine pairwise relationships between variables. Finally, the Spearman Rho product-moment correlation analysis was used to determine significant relationships among public stadiums in the South-East and South-South zones of Nigeria regarding the provision of access control devices for user safety. Analysis of variance was used to compare the means of three groups to determine if there is a statistically significant difference between them. Sixteen (16) variables were used in the study as depicted in Table 2: Twelve (12) of the variables were ordinal, two (2) were nominal, while two (2) were interval.

Table 2: Definition of Variables

V/N	Description	Code	Measurements	Values	Categories
	Access Control Variables				
V1	Access control device capacity adequate	ACDA	Ordinal	1-5	1-(least adequate), 2-(adequate), 3-(neither), 4-(more adequate), 5-(most adequate)
V2	Difficulty of entering through access control device	DEACD	Ordinal	1-5	1-(least difficult), 2-(difficult), 3-(neither), 4-(more difficult), 5-(Most difficult)
V3	Supply of electricity at access control device	SE	Ordinal	1-5	1-(least regular), 2-(regular), 3-(neither), 4-(more regular),5-(most regular)
V4	Alternative source of power	ASPS	Ordinal	1-5	1-(least available), 2-(available), 3-(neither), 4-(more available), 5-(most available)
V5	Access control device located near emergency exit point	ACDE	Ordinal	1-5	1-(least near), 2-(near), 3-(neither), 4-(more near), 5-(most near)
V6	Age of device	AOD	Interval	1-4	1-(1yr-5yrs),2-(6yrs-10yrs), 3-(11yrs-15yrs), 4-(Above 16yrs)
V7	Access control device periodically maintained	ACDM	Interval	1-4	1-(1month-6months),2-(7months-12months), 3-(13 months-18 months), 4-(Above19 months)
V8	Frequency of security breaches at access control device	FSBA	Ordinal	1-5	1-(least frequent), 2-(frequent), 3-(neither), 4-(more frequent), 5-(most frequent)
V9	Time taken to repair faulty access control device	TTRF	Ordinal	1-5	1-(least frequent), 2-(frequent), 3-(neither), 4-(more frequent), 5-(most frequent)
V10	Device outdated compared to current security standards	DOCS	Nominal	1-2	1- yes, 2- no
V11	Device operational or faulty	DOF	Nominal	1-2	1- yes, 2- no

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	User Safety Variables				
V12	Stadium security aggressive at access control device	SSAU	Ordinal	1-5	1-(least frequent), 2-(frequent), 3-(Neither), 4-(more frequent), 5-(most frequent)
V13	Staff trained to manage access control device	STMA	Ordinal	1-5	1-(least frequent), 2-(frequent), 3-(Neither), 4-(more frequent), 5-(most frequent)
V14	Access control device used alongside integrated security system	ACDSS	Ordinal	1-5	1-(least often), 2-(often) 3-(Neither), 4-(More often),5- (most often)
V15	Stadium layout affects crowd flow	SLCF	Ordinal	1-5	1-(least frequent), 2-(frequent), 3-(Neither), 4-(more frequent), 5-(most frequent)
V16	Frequency of safety incidents (e.g. Stampedes)	FSI	Ordinal	1-5	1-(least frequent), 2-(frequent), 3-(Neither), 4-(more frequent), 5-(most frequent)

Source: (Field work 2024)

IV. RESULTS

Table 3.0. depicts a cross-tabulation analysis showing the relationship between variable V10(device outdated compared to current security standard - yes/no) and variable V11(device operational or faulty - yes/no).

1. The table presents the observed and expected counts for each combination of variables V10 and V11:

Device outdated device operational count expected count:

Yes	Yes	115	103.9
Yes	Yes	111	122.1
No	Yes	62	73.1
No	No	97	85.9

Total valid cases : 385

2. Chi-square tests for V10 and V11:

The tests as shown in Table 3.1 show statistically significant association between variables V10 and V11:

Spearman Rho Chi-square: value = 5.314; p-value = 0.021.

This is significant at the 0.05 level.

Fisher's exact test: p-value(2 sided) = 0.023; Also significant; community correction, likelihood ratio, and linear-by-linear association all support the same conclusion. We therefore conclude that there is significant relationship between whether an access control device is outdated and whether it is operational or faulty.

3. Symmetric Measures for V10 and V11:

Table 3.0: Cross-tabulation of variable V10(device outdated) and V11(device operational/faulty)

			Device operational or faulty		
			Yes	No	Total
Device outdated compared to current security standard	Yes	Count	115	111	226
		Expected Count	103.9	122.1	226.0
	No	Count	62	97	159
		Expected Count	73.1	85.9	159.0
Total		Count	177	208	385
		Expected Count	177.0	208.0	385.0

Source: Author's SPSS output (2025)

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Table : 3.1: Chi-Square Tests for variables V10 and V11

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.314[a]	1	.021		
Continuity Correction[b]	4.846	1	.028		
Likelihood Ratio	5.340	1	.021		
Fisher's Exact Test				.023	.014
Linear-by-Linear Association	5.300	1	.021		
N of Valid Cases[b]	385				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 73.10.
b. Computed only for a 2x2 table

Source: Author's SPSS output (2025)

Tables: 3.2: Symmetric Measures for variables V10 and V11

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.117			.021
	Cramer's V	.117			.021
Interval by Interval	Pearson's R	.117	.050	2.315	.021[c]
Ordinal by Ordinal	Spearman Correlation	.117	.050	2.315	.021[c]
N of Valid Cases		385			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.
c. Based on normal approximation.
Source: Author's SPSS output (2025)

These measures as depicted in Table 3.2 qualify the strength of the association between variables V10 and V11: Phi= 0.117; Cramer's V= 0.117; Pearson's R= 0.117; Spearman correlation = 0.177. All measures have a P-value of 0.021, confirming a weak but significant positive relationship.

Summarizing the interpretation; Access control devices that are outdated in the study area are more likely to be faulty than expected by chance; the relationship is statistically significant but not strong (effect size = 0.117); Suggesting that while obsolescence is associated with operational challenges, other factors may also be at play.

Figure 3 depicts data set on variable V1 (access control device capacity adequate) for the 4 sampled stadiums.

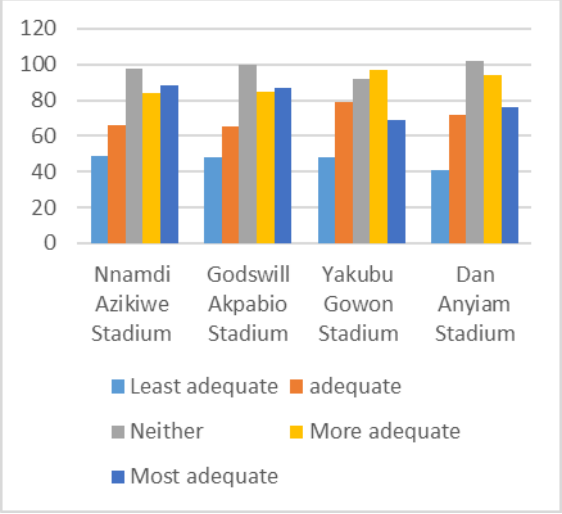

Figure 3: Fieldwork (2024)

The frequency and descriptive statistics from the survey of 385 respondents, shows the perceived adequacy of access control devices (V1) of the four sampled stadiums in South-East and South-South Nigeria. The data for each stadium is remarkably similar, suggesting consistent (around 21-25%) selected "Neither," indicating significant neutrality or uncertainty.

The specific findings for each stadium were as follows:

a) Nnamdi Azikiwe Stadium

- Perception: Leaning positive. The combined "More adequate" and "Most adequate" responses (48.4%) outweigh the negative ones ("Least adequate" and "adequate") (29.8%).
- Central Tendency: The mean is 3.31 (on a likely 1-5 scale), and the median is 3.00, confirming a central, slightly positive average.
- Highlight: "Most adequate" is the single most common response (Mode = 5.00, 25.5%), but this is tempered by a very high "Neither" response (21.8%).

b) Godswill Akpabio Stadium

- Perception: Almost identical to Nnamdi Azikiwe, leaning positive. Positive responses ("More"+"Most") total 48.6%, compared to 29.4% negative.
- Central Tendency: The mean (3.33) and median (3.00) are nearly identical to the first stadium.
- Highlight: This stadium has the highest percentage for "Most adequate" at 26.0%.

c) Yakubu Gowon Stadium

- Perception: The most neutral/negative of the four. Positive responses (41.8%) are lower than the others, and the "Neither" response is the highest at 25.2%
- Central Tendency: Has the lowest mean score of 3.20.
- Highlight: The mode is 3.00 ("More adequate"), which is different from the other stadiums where the mode was 5.00 ("Most adequate"). This reinforces its position as the least favored.

d) Dan Anyiam Stadium

- Perception: Leaning positive, with the strongest positive skew. Positive responses ("More" + "Most") total 46.2%.
- Central Tendency: The mean is 3.33, matching Godswill Akpabio Stadium.
- Highlight: Has the highest percentage for "Most adequate" (26.5%) and the lowest for "Least adequate" (10.6%).

Comparative Analysis of the sampled stadiums and general interpretation.

1. Noticeable Similarity: The distributions for all four stadiums are very close. The standard deviations (~1.35) and means (~3.3) are nearly identical, indicating that respondents did not strongly differentiate between the stadiums in their perceptions of adequacy.

2. Slightly Positive, but unclear: While the mean scores are above the midpoint (which would be 3.0 if 1=Least and 5=Most), the high percentage of "Neither" responses (consistently over 21%) is the most significant finding. This suggests that many respondents view the stadiums positively, a very large segment of the population is undecided or do not find them particularly adequate or inadequate.

3. Relative Ranking: Based on the data:

- 1st (Tie): Godswill Akpabio & Dan Anyiam Stadia (Mean: 3.33)
- 3rd: Nnamdi Azikiwe Stadium (Mean: 3.31)
- 4th: Yakubu Gowon Stadium (Mean: 3.20)

4. Lack of Strong Negativity: In all the stadiums, the "Least adequate" category has the lowest or second-lowest frequency, suggesting that outright negative perceptions are the minority view.

Findings from V1 database

The survey findings reveal that public perception of access control devices across the four stadiums is moderately positive, though marked by a high level of neutrality. There is no strong consensus regarding their adequacy. Among the facilities,

Yakubu Gowon Stadium is viewed somewhat less favorably than the others. The substantial proportion of neutral (“Neither”) responses suggests a need for further investigation to identify the factors that could shift this large undecided group toward a clearer positive or negative stance.

Figure 4 shows data set on variable V2 (difficulty of entering through access control device) for the 4 sampled stadiums.

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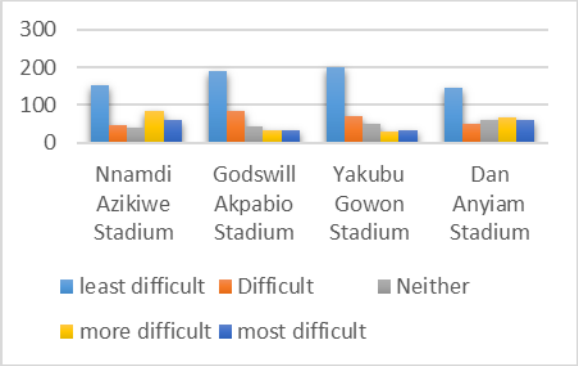

Figure 4: Dataset on V2
Source: Fieldwork (2024)

The data from the same 385 respondents reveal perceptions of the ease of access and use of the four stadiums. The results differ notably from the "adequacy" findings. In this variable (V2), responses are predominantly positive, showing a strong consensus that the stadiums are generally "least difficult" to access. Among them, Godswill Akpabio and Yakubu Gowon Stadiums stand out as being perceived as the easiest to access by a considerable margin. The specific findings for each Stadium were as follows:

a.) Nnamdi Azikiwe Stadium

- Perception: Leaning positive, but with notable difficulty. A large plurality (40.0%) find it "least difficult," but a combined 37.4% find it "more" or "most difficult," which is a substantial minority.
- Central Tendency: The mean is 2.61, the highest (i.e., most difficult) of all four stadiums.
- Highlight: Has the second-highest percentage for "most difficult" (15.6%), indicating a distinct segment of users faces significant challenges here.

b.) Godswill Akpabio Stadium

- Perception: Extremely positive regarding accessibility. Nearly half of all respondents (49.1%) find it "least difficult." The combined negative responses ("more" + "most difficult") are very low at 16.9%.
- Central Tendency: The mean is 2.05, indicating a perception leaning strongly towards "easy."
- Highlight: Has the lowest mean score and the highest "least difficult" percentage, making it the stadium perceived as the easiest to access.

c.) Yakubu Gowon Stadium

- Perception: The most positive of all. An absolute majority (52.2%) find it "least difficult." The combined negative responses are the lowest at 15.8%.
- Central Tendency: The mean is 2.01 (the lowest), and the median is 1.00, both strongly confirming the perception of ease.
- Highlight: This is the only stadium where the median is 1.00 ("Least difficult"), meaning over half of the respondents rated it as the easiest category.

d.) Dan Anyiam Stadium

- Perception: Similar to Nnamdi Azikiwe, leaning positive but with significant challenges. A large group (37.9%) find it "least difficult," but a combined 33.8% find it "more" or "most difficult."
- Central Tendency: The mean is 2.61, tied with Nnamdi Azikiwe as the highest (most difficult).
- Highlight: Has the highest percentage for "Neither" (15.3%), suggesting more ambiguity about its accessibility compared to others.

Comparative Analysis of the sampled stadiums and general interpretation

1.Clear Ranking by Perceived Difficulty (from Easiest to Most Difficult):

- 1st: Yakubu Gowon Stadium (Mean: 2.01)
- 2nd: Godswill Akpabio Stadium (Mean: 2.05)
- 3rd / 4th (Tie): Nnamdi Azikiwe & Dan Anyiam Stadiums (Mean: 2.61)

2. Positive Skew: The data is heavily skewed towards "least difficult." For the top two stadiums (Yakubu Gowon and Godswill Akpabio), over 70% of respondents selected either "Least difficult" or "Neither" (which implies no difficulty). This is a very strong positive indicator for accessibility.

3. Polarization at Two Stadiums: Nnamdi Azikiwe and Dan Anyiam show a more divided opinion. While more respondents find, them "least difficult," a substantial and sizeable group (over 33%) find them difficult. This suggests specific, persistent accessibility issues at these two locations that are not as prevalent as the others.

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4. Contrast with V1 Data (Adequacy): This is the most critical insight. A stadium can be considered "adequate" in its facilities (V1) but still "difficult" to access (V2). This is perfectly illustrated by Nnamdi Azikiwe and Dan Anyiam Stadiums, which scored well on adequacy but are tied as the most difficult to access. Conversely, Yakubu Gowon Stadium was rated lowest for adequacy but highest for ease of access.

Findings from V2 data set
The survey results show a strong consensus that Godswill Akpabio and Yakubu Gowon Stadiums are widely perceived as very easy to access. In contrast, Nnamdi Azikiwe and Dan Anyiam Stadiums are considered significantly more difficult to reach or use, even though they are generally regarded as adequate in terms of facilities.

This presents two dimensions of user experience in the sampled stadiums:

- Facility Quality (V1) engendered by access control device: addressed by the stadium's internal amenities and conditions.
- Accessibility (V2) component engendered by access control device: addressed by location, transport links, traffic, parking, and ingress/egress.

For a complete positive perception, a stadium must perform well on both dimensions. The data suggests that Yakubu Gowon and Godswill Akpabio may have better locations or transport access, while Nnamdi Azikiwe and Dan Anyiam, despite having good facilities, may be let down by their accessibility.

Test of hypothesis 1: V9 versus V16
H01: Access control device has no significant impact on user safety in public stadiums in South-East and South-South zones of Nigeria.

Table 5 shows the correlation analysis results for the testing of Hypothesis 1 using two ordinal variables V9 versus V16.

Tables 5: correlation analysis results for the testing of Hypothesis 1 using two ordinal variables V9 versus V16.

		Time taken to repair faulty access control device	Frequency of safety incidents
Time taken to repair faulty access control device	Pearson Correlation	1	.724**
	Sig. (2-tailed)		.000
	N	385	385
Frequency of safety incidents	Pearson Correlation	.724**	1
	Sig. (2-tailed)	.000	
	N	385	385

Correlation is significant at the 0.01 level (2-tailed).
Source: SPSS output (2025)

The Pearson correlation coefficient of 0.724 indicates a strong positive relationship between the time taken to repair faulty access control devices and the frequency of safety incidents. Given that the p-value (0.000) is below the 0.01 significance level, the null hypothesis (H_0) is rejected in favor of the alternative hypothesis (H_1), which asserts that *access control devices significantly impact user safety in public stadiums across the South-East and South-South zones of Nigeria*.

This finding suggests that the efficient operation and prompt maintenance of access control systems play a crucial role in enhancing both the perceived and actual safety of users within these facilities.

Test of hypothesis 2: V5 versus V15
H02: There is no significant difference among public stadiums in the study area in provision of access control devices for user safety.

Table 6 presents the Spearman Rho's correlation analysis results for the testing of hypothesis 2 using variables V5 versus V15.

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Table 6: Spearman Rho correlation analysis results for the testing of V5 versus V15 Correlations

			Access control device located near emergency exit point	Stadium layout affects crowd flow
Spearman's rho	Access control device located near emergency exit point	Correlation Coefficient	1.000	.701**
		Sig. (2-tailed)	.	.000
		N	385	385
	Stadium layout affects crowd flow	Correlation Coefficient	.701**	1.000
		Sig. (2-tailed)	.000	.
		N	385	385

Correlation is significant at the 0.01 level (2-tailed).
Source: SPSS output (2025)

The Spearman Rho value of 0.701 on Table 6 indicates a strong positive relationship between access control device located near emergency exit point and stadium layout affects crowd flow. The p-value (0.00) further confirms that this correlation is statistically significant at the 0.05 level.

The ANOVA test result of Table 7 shows the F-value of 116.988 with a significance level (P-value) of 0.00, which is less than 0.05.

Table 7: Anova test result for hypothesis 2: V5 versus V15
Access control device located near emergency exist point

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	381.194	4	95.299	116.988	.000
Within Groups	309.549	380	.815		
Total	690.743	384			

Source: Author's SPSS Output (2025)

Therefore, the null hypothesis was rejected and the alternate chosen which states that there is a significant difference among public stadiums in the study area in the provision of access control devices for user safety.

Tables 8 and 9are the results of a multiple comparison analysis, used to compare the differences in the perceived impact of different stadium layouts on the "Access control device located near emergency exit point". The analysis used three methods: Turkey HSD, LSD, and Duncan.

Table 8: Multiple Comparisons: Dependent Variable: Access control device located near emergency exit point

	(I) Stadium layout affects crowd flow	(J) Stadium layout affects crowd flow	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	Nnamdi Azikiwe Stadium	God'swill Akpabio Stadium	-.26190	.18453	.488	-.7381	.2143
		Yakubu Gowon Stadium	-.20746	.20279	.736	-.7308	.3158
		Dan Anyiam Stadium	-1.41315*	.17990	.000	-1.8774	-.9489

	God'swill Akpabio Stadium	Nnamdi Azikiwe Stadium	.26190	.18453	.488	-.2143	.7381
		Yakubu Gowon Stadium	.05443	.18136	.991	-.4136	.5224
		Dan Anyiam Stadium	-1.15126*	.15534	.000	-1.5521	-.7504
	Yakubu Gowon Stadium	Nnamdi Azikiwe Stadium	.20746	.20279	.736	-.3158	.7308
		God'swill Akpabio Stadium	-.05443	.18136	.991	-.5224	.4136
		Dan Anyiam Stadium	-1.20569*	.17665	.000	-1.6615	-.7499
	Dan Anyiam Stadium	Nnamdi Azikiwe Stadium	1.41315*	.17990	.000	.9489	1.8774
		God'swill Akpabio Stadium	1.15126*	.15534	.000	.7504	1.5521
		Yakubu Gowon Stadium	1.20569*	.17665	.000	.7499	1.6615
LSD	Nnamdi Azikiwe Stadium	God'swill Akpabio Stadium	-.26190	.18453	.157	-.6247	.1009
		Yakubu Gowon Stadium	-.20746	.20279	.307	-.6062	.1913
		Dan Anyiam Stadium	-1.41315*	.17990	.000	-1.7669	-1.0594
	God'swill Akpabio Stadium	Nnamdi Azikiwe Stadium	.26190	.18453	.157	-.1009	.6247
		Yakubu Gowon Stadium	.05443	.18136	.764	-.3022	.4110
		Dan Anyiam Stadium	-1.15126*	.15534	.000	-1.4567	-.8458
	Yakubu Gowon Stadium	Nnamdi Azikiwe Stadium	.20746	.20279	.307	-.1913	.6062
		God'swill Akpabio Stadium	-.05443	.18136	.764	-.4110	.3022
		Dan Anyiam Stadium	-1.20569*	.17665	.000	-1.5530	-.8584
	Dan Anyiam Stadium	Nnamdi Azikiwe Stadium	1.41315*	.17990	.000	1.0594	1.7669
		God'swill Akpabio Stadium	1.15126*	.15534	.000	.8458	1.4567
		Yakubu Gowon Stadium	1.20569*	.17665	.000	.8584	1.5530

The mean difference is significant at the 0.05 level.

Source: Author's SPSS Output(2025)

The dependent variable is "access control device located near emergency exit point", while the comparison subjects are four stadiums:

- Nnamdi Azikiwe Stadium
- God'swill Akpabio Stadium

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- Yakubu Gowon Stadium
- Dan Anyiam Stadium

The analysis results for Turkey HSD and LSD tests show that significant differences exist between Dan Anyiam Stadium and each of the other three stadiums (Sig. = 0.000), with substantial mean differences (all exceeding 1.0). The tests further show that are no significant differences between any other pairs of stadiums (Sig. > 0.05).

The Duncan Test and Subset Analysis depict that the stadiums are divided into two Homogeneous Subsets:

- Subset 1: Nnamdi Azikiwe, Yakubu Gowon, God's will Akpabio (Means between 2.46–2.73)
- Subset 2: Dan Anyiam (Mean = 3.88)

The result indicates that Dan Anyiam's rating is perceptibly higher than the other three stadiums.

Table 9: Access control device located near emergency exit point

	Stadium layout affects crowd flow	N	Subset for alpha = 0.05	
			1	2
Tukey HSD[a]	Nnamdi Azikiwe Stadium	69	2.4638	
	Yakubu Gowon Stadium	73	2.6712	
	God'swill Akpabio Stadium	113	2.7257	
	Dan Anyiam Stadium	130		3.8769
	Sig.		.469	1.000
Duncan[a]	Nnamdi Azikiwe Stadium	69	2.4638	
	Yakubu Gowon Stadium	73	2.6712	
	God'swill Akpabio Stadium	113	2.7257	
	Dan Anyiam Stadium	130		3.8769
	Sig.		.173	1.000

Means for groups in homogeneous subsets are displayed.
a. Uses Harmonic Mean Sample Size = 89.419.
Source: Author's SPSS Output (2025)

V. CONCLUSION

Access control devices have a significant impact on user safety in public stadiums across the South-East and South-South zones of Nigeria. These devices serve as vital tools for regulating and monitoring the movement of spectators and staff. The relevance of access control devices also extends to maintenance and operational efficiency. Well-maintained systems reduce the risk of malfunction that could compromise safety during peak crowd activities. Differences observed among stadiums in these regions reveal that facilities with better-designed and regularly serviced access control systems experience fewer safety incidents and higher levels of user confidence.

In essence, access control devices are indispensable components of stadium safety infrastructure. Their strategic deployment, continuous maintenance, and integration with broader security frameworks significantly enhance both the perceived and actual safety of users, ensuring that public stadiums in the South-East and South-South regions of Nigeria remain secure, organized, and conducive for large-scale public events.

However, a major limitation of the study was that it did not explore effect of integration with smart stadium ecosystems. Future research could explore how unified access control platforms and advanced automation could impact on user safety in stadiums.

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