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Understanding Crowd Control in Sports Facilities: Through Current Design Strategies in Existing Sports Centers

Agim Ogechukwu Hyginus[1], Dr. Wariebi Gabriel Brisibe[2], Dr. Chizzy Akani[3]

[1]Department of Architecture, Rivers State University, Nigeria.

[2]Department of Architecture, Rivers State University, Nigeria.

[3]Department of Architecture, Rivers State University, Nigeria.

Email for correspondence: agimogenna@gmail.com, Contact mobile no.: 08031362608

Abstract

The study investigates the importance of user safety in sporting facilities, which necessitates careful consideration. Because of the massive crowds that attend sporting events, there is a high rate of crowd catastrophe and disorderliness. One of the major concerns among researchers and professionals is the rise in the number of accidents and injuries among participants at public events, particularly sporting activities. People who attend sporting events form crowds whose safety must be ensured because crowded settings can be dangerous. As a result, the goal of this study is to evaluate the crowd management design elements and tactics used in the construction of sporting facilities or complexes in Nigeria and other nations. The goal is to improve the design of sports facilities so that they can better handle large audiences during extreme events, which will increase safety and security. Data was gathered from primary sources such as field investigations, case studies, and appraisals of certain current crowd management design solutions in existing sports facilities or complexes, as well as secondary sources such as web sites, documentations and journals, surveys, and other sources. This study examines some crowd control design strategies and how adaptable they are in existing sports facilities or complexes in order to improve crowd management rules for this type of public facility. It also suggests that proper attention be paid to the appropriate proportion of occupants to an area of space to avoid crowd congestion or constipation.

Keywords: *crowd management, sporting facilities, design strategies, safety and security*

1.0 Introduction

A crowd is a big group of people that gather for a limited time at a specified location for a certain event (Memish et al, 2012). Concerts, religious, and sporting events, for example, are examples of such occasions. Crowd control research focuses on enhancing crowd safety and well-being at events with large crowds, such as sporting events. A sports center is a structure where people can participate in various sports and activities (Macmillan Dictionary, 2022). Crowd violence in sports facilities has long been a problem around the world, although certain countries have performed studies on the subject. Lowrey (2002) conducted a study on football-related violence in England, focusing on factors such as alcohol consumption, bad refereeing, and fan antagonism as sources of disorder. According to Krausz and Bauckhage

(2012), there is a strong potential for crowd densities to rise up in huge meetings such as sports and religious events, which can result in property destruction, injuries, and fatalities. The basic goal of building safety is to keep people safe in the event of an emergency as well as in normal circumstances. Architects' contributions to disaster management can range from short-term fixes to long-term plans for future developments, such as the construction of new disaster-resistant structures or the reconstruction of destroyed structures after a formal assessment of damage to the built environment (Brown and Downey, 2006). Improvements in building structure and services must be accompanied by an effective building layout design based on the interrelationships of building operations, circulation, and occupant characteristics, in order to mitigate the consequences of extreme events on people (Sagun et al., 2014). The primary purpose of this research is to identify several crowd management tactics that can be included in the design of a sports complex, center, or facility to effectively manage crowds. The study will also add to the corpus of information on crowd control for sporting events, open up new avenues for crowd control research, and serve as a resource for future scholars working on similar or related projects.

1.1. Definition of Terms

Crowd Control refers to the activities required to direct and regulate people who are at or may assemble at a disaster site so that they do not interfere with emergency operations. "Designate" refers to a person who has been officially allocated responsibility and authority for a role that was previously performed by another person. (Law Insider Dictionary, 2022).

Sport Facility refers to the enclosed areas of sports pavilions, stadiums, gymnasiums, health spas, boxing arenas, swimming pools, roller and ice rinks, billiard halls, bowling alleys, and other similar places where the general public gathers to engage in physical activity, compete in athletic competition, or watch sporting events (Law Insider Dictionary, 2022).

Design Strategy refers to the confluence between business strategy and design thinking (Jahan Hussain, 2010). It is the intersection of what is important to people and what is profitable for organizations (Ed Orozco, 2020).

2.0 Review of Relevant Studies on Crowd Control

2.1 Crowd Control Concept

As shown in Figure 2.1 below, Simpson (2000) developed a notion of crowd gathering phases that encompass the assembling, temporary gathering, and dispersing processes. He stated that crowd collecting is a three-step process with a start, middle, and end. The assembly process is defined as the movement of people from multiple locations converging at a specific spot

within a set time frame. The number of access routes, wayfinding and signage, advance ticket sales, and the quality of lighting within the venue all have a role in determining the size of the audience at this point. The consequence of the assembling process is the temporary gathering phase. According to Benjamin (2000), a temporary gathering is a gathering of individuals and groups in a specific location who engage in both individual and collective activities and actions. The dispersal process, which involves moving individuals from one spot to one or more alternate destinations, is the final phase of crowd gathering. Dispersal might take place on a regular, emergency, or coercive basis (Simpson, 2000). Dispersal based on routine occurs as a result of an event lasting a certain amount of time in a completely typical environment. When individuals evacuate a location as a result of an unplanned disaster such as a fire, explosion, or flood, this is known as emergency dispersal. Effective communication is necessary in emergency scenarios to reduce the level of disaster at the center. The communication process must be adaptable, and the information communicated must be clear, succinct, courteous, accurate, complete, and directed correctly (Watt, 1998). When security officers' resort to using force to relocate persons or groups that refuse to disperse after an event, this is known as coercion dispersion. The image below depicts the three stages of the crowd gathering and dispersing process;

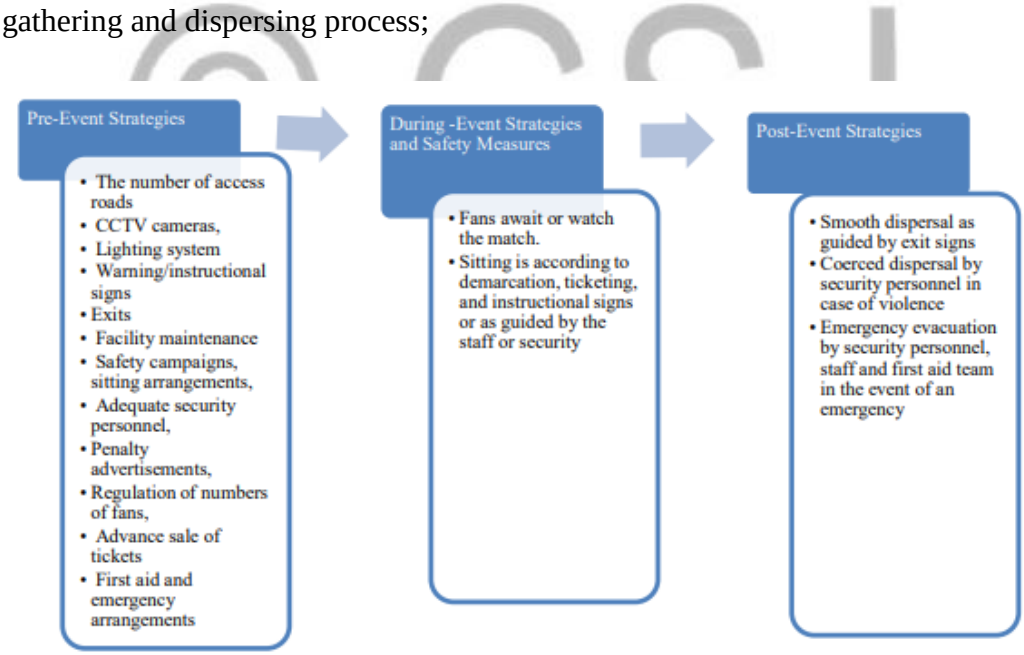

Figure 2.1: Crowd Gathering Phase and Dispersal

Source: Simpson (2000)

2.2 Crowd Dynamics and Behavior at Sport Events

The study of how, where, and when crowds form is known as crowd dynamics. A variety of elements influence people's conduct at public events. The majority of these elements are design-related, while others are dependent on people or special circumstances. Individual components can be divided into four groups (Zachary and Carey, 2017);

1. To sense: In this stage, the person uses their sense knowledge to get information from the environment.
2. To interpret: At this point, the individual tries to make sense of the data he or she has been given.
3. To decide: The individual makes a decision on how to use the information.
4. To act: Based on the information, the individual takes some action.

In both normal and panic situations, the behavior of specific individuals has been examined to determine the behavior of the crowd (Benthom, 2016). When leaving, it is natural to follow one's instincts and strive to go as quickly as possible. Most individuals follow the 'faster-is-slower' theory, which states that persons who move quickly and uncoordinatedly cause the entire throng to move slower. Most people will evacuate buildings along a route that they are familiar with and comfortable with (in most cases; the main entry or exit). In this case, experience works against you because a large number of people will ignore alternate exits, causing congestion at the ones that are being used, as seen in figure 2.2. In non-emergency situations, a wise selection could be made by determining which exit is the most appropriate and selecting the one with the shortest exit time.

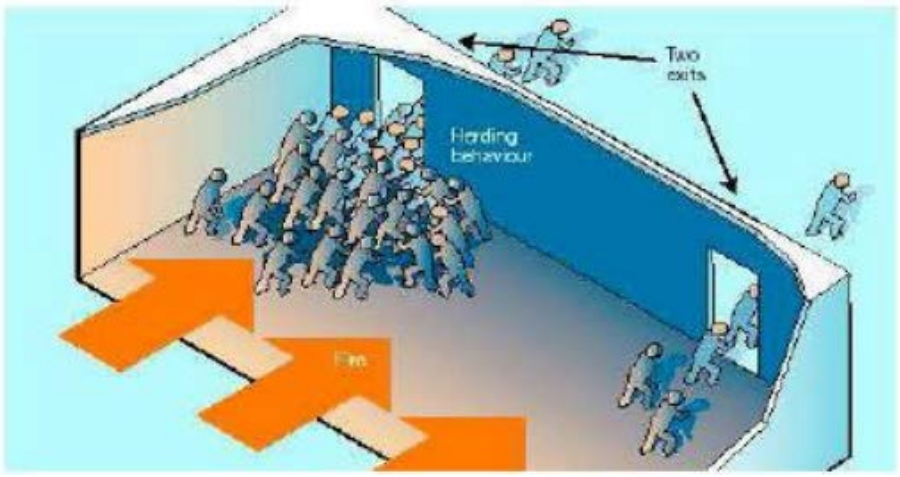

Figure 2.2: Crowd trying to escape from a Smoke-Filled Room

Source: Helbing and Molnar (2001)

2.3 Crowd Disaster Process

Structure failure as a result of higher-than-expected attendance, Crowd Behaviors (individuals making up a crowd's actions and reactions to situations and events), and natural occurrences such as severe rainfall (National Disaster Management Authority (NDMA), 2014). Because of these characteristics, spectators/users of the facility experience fright or excitement, which leads to evacuation or crowd congestion. The prevalence of crowds at sporting events has long been a problem.

According to Lewis (2007), spectator antagonism can be classified into six categories: Singing, chanting, and yelling insults or obscenities are examples of verbal abuse. swarming, for example, rushing to the field or stage and attempting to crash the entryways to gain passage; ‘missile,' i.e., hurling, which includes throwing food, beverages, blocks, bottles, broken seats, and mobile phones at specific or random targets; property destruction includes beating down sound systems, tearing up the playing field, and harming the setting or other properties; bodily attacks include spitting, kicking, pushing, clench hand combat, stabbings, and shooting. Furthermore, figure 2.3 outlines the variables that contribute to crowd disaster at public events such as sports.

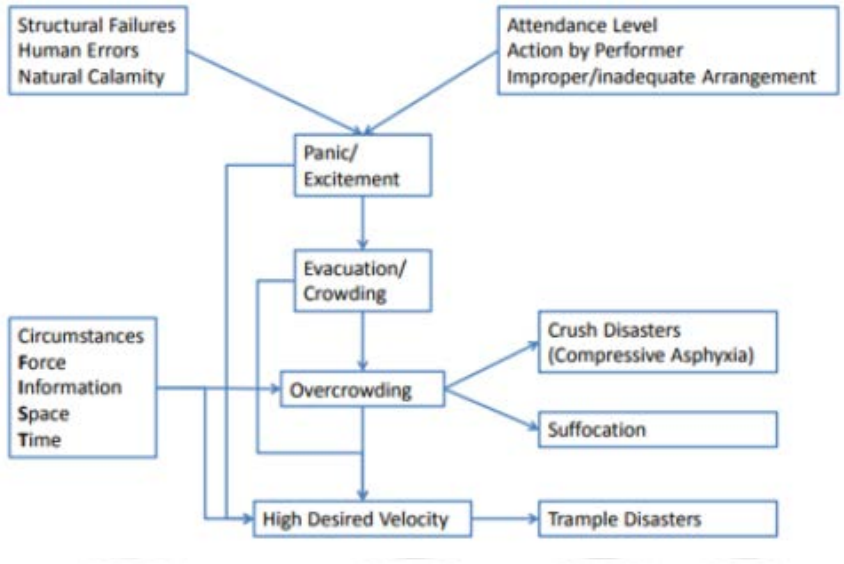

Figure 2.3: Crowd Disaster Process

Source: National Disaster Management Authority (NDMA), 2014

2.4 Crowd Management

According to Fruin (1993), in their early designs of structures, architects and engineers frequently pay little attention to people's movement; most of these designs fail to meet building codes. Building standards compliance ensures that a structure functions properly in both normal and emergency situations. When it comes to crowd control and management, all corridors, stairs, ramps, elevators, and other facilities must be designed with the predicted maximum occupancy levels in mind. As part of the life security assessment of a new public event site, architects are responsible for establishing a passive crowd control design.

A well-designed circulation pattern will point out potential issue areas, and most crucially, describes how the design will accommodate routine and emergency crowd movement. The architect's attention in passive crowd control designs should be on the capacity of corridors, staircases, pedestrian and vehicular movements, and waiting places. The architectural design composition, spaces, and features included in the design are all important in creating a

building in which users can readily understand the spaces as well as grasp the graphical image (Fruin, 1993). People's flow rate, door measurements, exit visibility, door state (open or closed), building geometry, and so on should all be taken into account in the design. Circulation paths, Barriers, wayfinding, and signage, as well as obstacles in the way of exits (such as furniture and columns).

2.5 Crowd Control Design Measures in Large Capacity Buildings

In large-capacity structures, crowd safety is extremely important. The criteria for crowd safety in high-capacity buildings conflict with those for security, as the former aims to expand modalities for ease of movement while the latter aims to control and monitor it (Billington et al., 2002). To create a reasonable equilibrium, there must be proper synergy between security and safety. The three most essential elements that can reduce evacuation time in big capacity buildings, according to Daoliang et al. (2006) and Helbing et al. (2002), are the location and width of exits, as well as the arrangement of environmental items. When considering the topic of passive crowd control, Sagun et al. (2008) outlined the design variables to consider.

i. Size and capacity of the structure
ii. Characteristics of the entry way
iii. The building's design
iv. The number of doors and passageways available
v. Dimensions of the path and the door
vi. Distances traveled
vii. Route and door dimensions.

Research Questions

To properly manage crowds, a variety of crowd management tactics can be implemented in the design of a sporting facility. The following research questions served as the basis for the study:

i. What are some of the crowd management design solutions that have been implemented in some of the existing sports facilities?
ii. How effective are these techniques during high-stakes sporting events and disasters?

3.0 Research Methodology

The methodology of the study is discussed in this chapter. The qualitative research approach was used in this study to investigate the current sports facilities that were chosen. To gather and interpret qualitative data, qualitative research methods primarily employ interviews,

journals, observations, and reading. In addition to data gathered through the literature review, this study employs an in-depth interview and a pre-planned observation program to collect data. The results of case studies on crowd management design tactics utilized in numerous current sports centers in tertiary institutions were studied and compared in order to develop answers for the facility's efficacy.

4.0 Findings and Discussions

This chapter looked at an assessment of five university sport facilities and proposed ideas for overcoming crowd control issues during sporting events. Obafemi Awolowo University, Ife (OAU IFE), University of Ibadan (UNI IBADAN), Ahmadu Bello University, Zaria (ABU ZARIA), Federal University of Technology, Minna (FUT MINNA), and University of Benin (UNI BENIN) are the five university sport centers investigated (UNI BEN). The names of the institutions, their founding years, the student and staff populations of the universities researched, and the last time the institutions held the NUGA games event are listed in Table 4.1 below;

Institution	Year of Establishment	Students Population	staff Population	Number of Editions hosted	Most recent year of Host NUGA Games
OAU IFE	1962	26,000	5,000	3	2014
UNI IBADAN	1948	19,521	6288	4	2002
ABU ZARIA	1962	49436	6177	3	2001
FUT MINNA	1983	20,000	3500	potential host	-
UNI-BEN	1970	56,501	5744	1	2011

Table 4.1: Institutions Studied

Source: Review of fieldwork by Grace Olushola JAIYEOLA, Isa Bala MUHAMMAD & Olagunju R.E (2017)

Tables and graphs were used to display the research findings. The review of findings on the sort of facility that attracts crowds in the researched universities is represented in Figure 4.1.

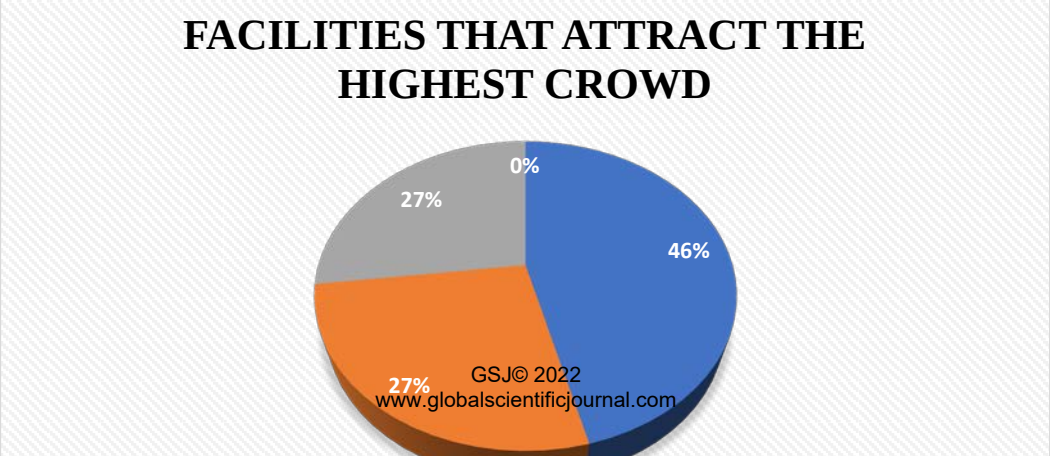

Figure 4.1: Facilities that attracts the Highest Crowd

Source: Review of fieldwork by Grace Olushola JAIYEOLA, Isa Bala MUHAMMAD & Olagunju R.E (2017)

Figure 4.1 illustrates that the sport hall attracts 46% of the users/spectators that attend the Federal Universities' sport facilities. The sport hall is a big indoor facility that is utilized for a variety of sports such as badminton, volley ball, and basketball. Figure 4.2 depicts a full sport hall at one of the Federal colleges under consideration. The gymnasium and swimming pool draw 27% of the audience to the sport facility.

Figure 4.2: Crowds at Ahmadu Bello University Sport Hall

Source: Review of fieldwork by Grace Olushola JAIYEOLA, Isa Bala MUHAMMAD & Olagunju R.E (2017)

The analysis of the key point of crowd congestion at the study of sports facilities is shown in Table 4.2 below;

Major Point of Crowd Congestion in Sport Hall

NAME OF UNIVERSITY	MAJOR POINT OF CROWD CONGESTION IN SPORT HALL			
	ENTRANCES	EXITS	TICKET POINT	CORE AREAS
OAU IFE	✓	✓	✓	✓
UNI IBADAN		✓		
ABU ZARIA	✓	✓		
FUT MINNA		✓		✓
UNI-BEN	✓	✓	✓	✓
TOTAL	3	5	2	3

Table 4.2: Major Point of Crowd Congestion in Sport Hall

Source: Review of fieldwork by Grace Olushola JAIYEOLA, Isa Bala MUHAMMAD & Olagunju R.E (2017).

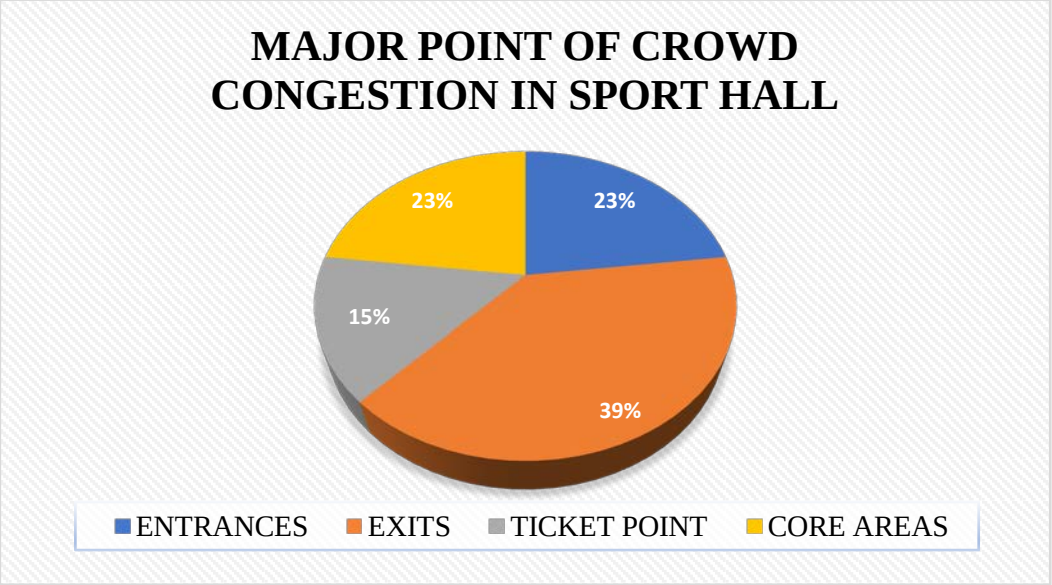

Figure 4.3: Major Point of Crowd Congestion in Sport Hall

Source: Review of fieldwork by Grace Olushola JAIYEOLA, Isa Bala MUHAMMAD & Olagunju R.E (2017).

In Figure 4.3, the data from table 4.2 was evaluated using a chart. In 39% of the Federal universities studied, crowding occurs at the exit. Passive crowd control strategies such as multiple exits, opening exit doors and gates, barriers, wayfinding and signage systems to coordinate crowd movement towards exit points to avoid congestion, and proper emergency communication should be implemented in sport facilities to reduce crowd congestion. Ticket booths, essential areas such as staircases, entrances, passageways, and corridors were also discovered to be points of crowd congestion throughout this study. Only 62% of the universities investigated have emergency exits, according to the graphs in Figure 4.4. In addition, after the event, 40% of the universities analyzed provided two exits for spectators

and building users. Figures 4.5, 4.6, and 4.7 also examined and assessed the widths of the entry door, pathways, and corridors.

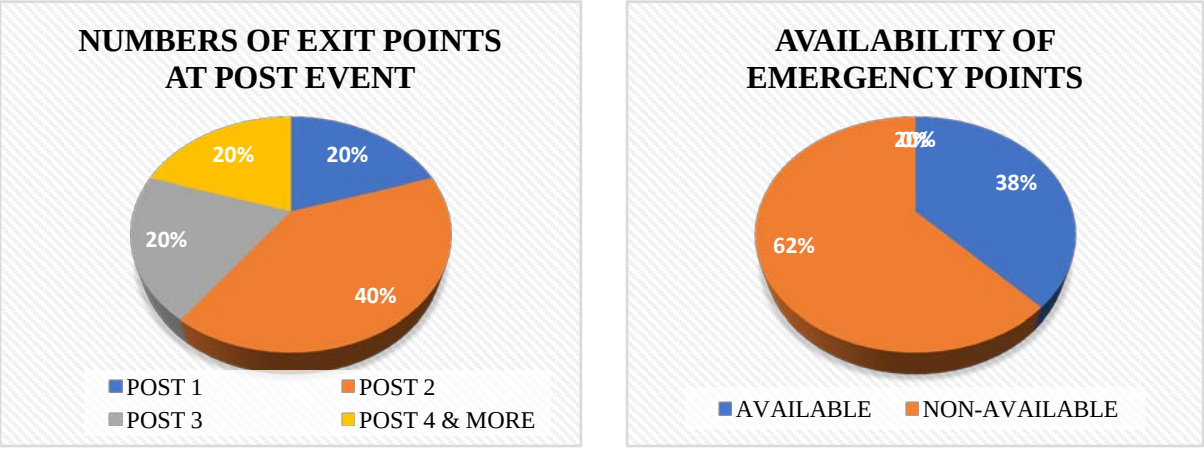

Figure 4.4: Numbers of Exit Points at Post Event and Availability of Emergency Exit

Source: Review of fieldwork by Grace Olushola JAIYEOLA, Isa Bala MUHAMMAD & Olagunju R.E (2017).

Figure 4.5: Widths of the Access Door

Source: Review of fieldwork by Grace Olushola JAIYEOLA, Isa Bala MUHAMMAD & Olagunju R.E (2017).

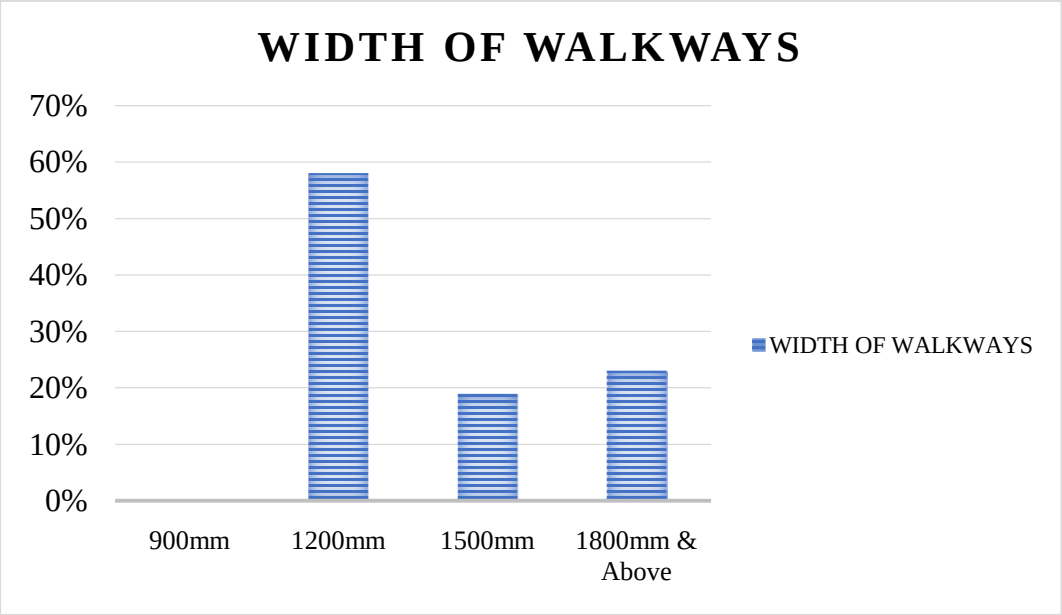

Figure 4.6: Width of the Walkways of the studied Universities

Source: Review of fieldwork by Grace Olushola JAIYEOLA, Isa Bala MUHAMMAD & Olagunju R.E (2017).

Figure 4.7: Width of the Corridors of the studied Universities

Source: Review of fieldwork by Grace Olushola JAIYEOLA, Isa Bala MUHAMMAD & Olagunju R.E (2017).

Diagrammatic Representation of Possible Solution for Crowd Control in Sports Facilities

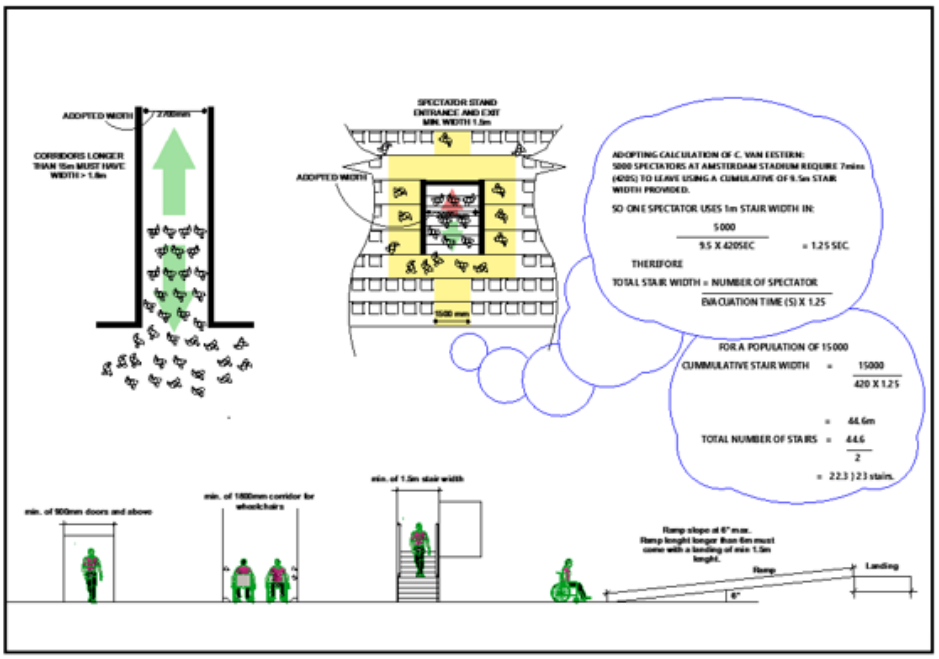

Figure 4.8: Image Showing Possible Solution for Crowd Control in Sports Facilities

Source: Author (2022)

5.0 Conclusion and Recommendations

To effectively address the issue of crowd management in large public buildings, an integrated strategy is required. The present features and qualities used in the design of the university's sports centers under consideration were the main focus of this study's examination. Because of insufficient coordination of crowd dispersal process towards exits, limited number of exits, and partially adequate door and walkway sizes, the crowd control design strategies adopted by a higher proportion of the studied universities are considered partially adequate and inadequate in some cases. According to the conclusions of the study, there is no particular provision for the disabled, which could contribute to slow movement and congestion at the entrances and exits. The majority of the institutions investigated did not have a distinct entry and exit for players, which could lead to spectator rivalry. Furthermore, several of the universities investigated lack emergency exits. During an emergency, the number of available exits may be insufficient, leading to a high number of casualties.

In this light, this study sheds light on the challenges that people face when faced with disasters and emergencies. The goal is to develop a method that takes into account changing building data. The evacuation method is highlighted since it is one of the most important steps in assessing and executing building safety and security measures. As a result of the study's findings and conclusions, the report suggests that sports facilities be improved by

designing various entry and departure points that can accommodate both routine and emergency situations. Special provisions for disabled spectators and athletes must be made in the construction of sports facilities. Ramps, unique entry/exit points, a separate sitting area, and other conveniences will help to reduce crowd slowdown and congestion caused by wheelchair users and disabled spectators. The research also suggests that in the design of sport facilities in Nigerian universities, crowd control features such as signage, wayfinding, and barriers be included.

References

Beech J & Chadwick, S. (2004). The Business of Sports Management. San Francisco: Prentice

Hall. Benjamin, C. (2000). Spectator Violence in Sports. A North American

Perspective. European Journal on Criminal Policy and Research, 8 (2), 163-181.

Dimmock, J., & Grove R. (2005). "Relationship of Fan Identification to determinants of

Aggression." Journal of Applied Sports Psychology: 17 (!), 37-47.

Flick, U. (2006). An introduction to qualitative research. London: Sage

Fruin, J. (1993). Pedestrian Planning and Design, 2nd Ed. Elevator World, Mobile AL.

Halabi, W. (2006). Overcrowding and the Holy Mosque, Makkah, Saudi Arabia, PHD thesis.

Newcastle upon Tyne, UK. Helbing D, F. I., & Molnar P, V. T. (2001). Simulating of

Pedestrian Crowds in Normal and Evacuation Situations.

Memish, Z, Stephens, G, Steffen, R & Ahmed, Q. (2012). "Emergence of Medicine for Mass

gatherings: Lessons from the Hajj." The Lancet infectious diseases, vol. 12, no. 1, pp.

56-65.

National Disaster Management Authority (NDMA). (2014). Managing Crowd at Events and

Venues of Mass Gathering.

Omolawon, K. (2000). Leadership and Sports Management. African Journal of Cross Cultural

Psychology and Sports Facilitation, Vol 1 pg. 6-8.

Pan, X., Han, C., Dauber, K.& Law, k. (2012). A multi-agent-based framework for the

simulation of human and Social Behaviors during Emergency Evacuations. Ai &

Society.

Simpson, S. (2000). Crowd Dynamics / Crowd Control. Institute for Non-Lethal Defense

Technologies. Penn state.

Young, K. (2002). “Standard deviations: An update on North America Sports Crowd Disorder.” Sociology of Sport Journal, Vol 19(3) Pg 237-275.

Zachary, S & Carey, M. (2017). Key crowd safety issues in the design of public