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ORIGINAL RESEARCH ARTICLE

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## Geo-Spatial Analysis of Event Centres in Kaduna Metropolis, Kaduna State, Nigeria

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### ABSTRACT

This study investigates the geographic distribution, categorization, and spatial pattern of event centres within Kaduna Metropolis using integrated Remote Sensing and GIS techniques. GPS was used to pick the coordinates of the existing event centres in the study area. A total of 57 event centres were identified and mapped, revealing a clustered distribution pattern predominantly concentrated in the southern part of the metropolis, especially around Barnawa ward. The event centres were categorized into indoor, outdoor, and combined indoor/outdoor types, with indoor centres constituting the majority (63.21%). The spatial clustering aligns with favorable social, cultural, and economic factors influencing patronage. Nearest Neighbor and Kernel Density analyses confirmed clustering and varying density levels across the metropolis, reflecting uneven access to event spaces. The study recommends a continuous monitoring and application of GIS spatial analysis to institutionalize and track changes in event centre distribution and demand, so as to enable proactive infrastructure adjustments.

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### Introduction

An event centre in simple terms, is the location hosting an event. Some centres are more common than others, but there is a never-ending list when creativity comes into play (Whitfield, 2009). The phrase “Events Centre” may sound foreign or modern; both are fallacies if considered as such. It is a fallacy in the sense that it exists in every organized society no matter how rustic (Roberts, 2016). Traditional African societies have their village squares for communal activities involving large crowds like festivals while the village or town halls are used

for such meetings that do not involve displays. An event is any occasion involving the gathering of people (Brown, 2018). The nature of the event determines the kind of crowd in attendance as well as defines the kind of attention or treatment to be given to a particular event. Therefore, an event is the gathering of people for celebration, entertainment or other forms of interaction (Orga and Tijjani, 2019).

Event Centres come in various forms and sizes, ranging from small community halls to large stadiums and convention Centres. Each type of

Centre caters to different types of events and audience sizes (Brown et al., 2015). The demand for event spaces has been steadily growing due to increased urbanization, globalization, and the rise of the experience economy. Consequently, there is increased competition among event Centres to attract clients and visitors (Aina, 2015).

Event Centres play a crucial role in hosting a wide range of activities, including concerts, sports events, conferences, weddings, exhibitions, and more. They serve as venues where people gather for various purposes, contributing to the cultural, social, and economic fabric of the study area. The analysis of event Centres is crucial for effective planning, management, and promotion of these venues. It encompasses a broad range of factors and methodologies aimed at optimizing their role in hosting events and contributing to the overall vibrancy of communities and economies (Dickinson, Jones and Leask, 2007).

However, the situation of event centres in Kaduna Metropolis, like any other event centre globally, is of both social and economic consequences. However, due to rapid urban growth, coupled with poor monitoring strategy, these event centres might be threatening which could be devastating if it is not properly managed. Human social and cultural construct are recognized worldwide as a major influence of the availability of event centres, hence the need to analyze their location, categories and their distribution pattern within matters (Johnson, 2020)

The event centres have always existed in urban settlements in Nigeria in various forms such as town halls, community centres, conference halls, stadiums, convention centres, planetariums, coliseums and modern-built event centres

(Olatunji and Yetunde, 2014). The modern event centres have diverse ownership varying from private individuals to organizations and agencies. Likewise, some are stand-alone independent utilities serving the sole purpose for event hosting; others are appendages of hospitality establishments. These identity differences likely influences their corporate goals and targets, especially in terms of whether they emphasize economic or social service to the community served (Philip, 2018).

Aina (2015) examined the extent of the respective difference in the service-capacity profile and the relative competitiveness of the service-quality offered by the centres reflective of the differences in their rural urban setting, of differences in the establishing (adoption) time of the studied event centres. Jegede and Aina (2023) examine the location and operation of recreation and tourist's event centres in Ekiti State. Data were generated directly on the field through primary method of data collection using questionnaire as the research instrument. A total of 2000 copies of structured questionnaire were administered. Results from this study revealed that, event centres significantly influence the patronage pattern of event centres in Ekiti State.

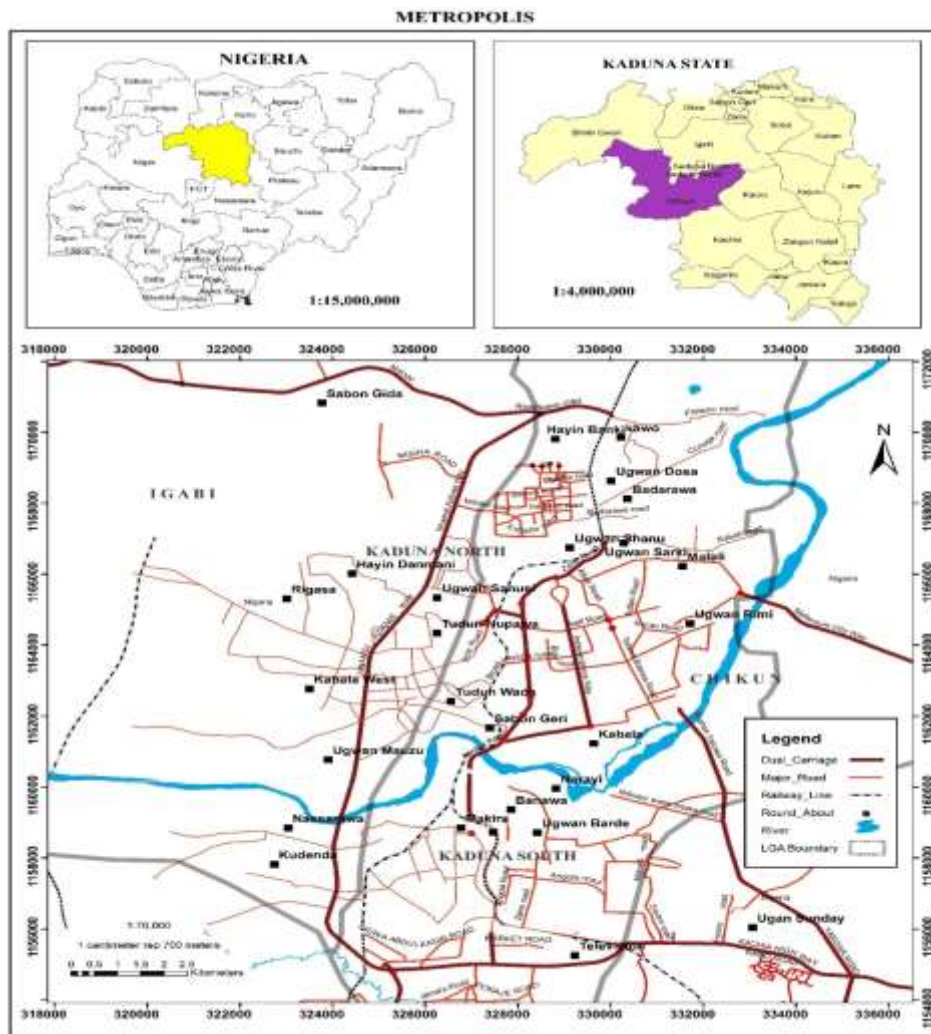
Payuba and Agah (2018) assessed available event centres and the design features used to achieve flexibility, examining their adaptation to inadequacy of event spaces in selected event centres in Minna Niger state. Flexibility overtime has been known to enhance the peculiarity of a space, making spaces adaptable to multipurpose use, without altering the functional requirements. Adebisi (2020) utilized GIS techniques combined with primary and secondary data types to map out the geographical location of indoor and outdoor types of event centres in Barnawa, Kaduna.

Despite existing studies, no recent research has comprehensively analyzed the spatial distribution and categorization of event centres across Kaduna Metropolis using integrated GIS and remote sensing techniques. This study, therefore, aims to fill this critical gap by updating and identifying the geographic locations, categories, and distribution patterns of event centres in the study area through these integrated geospatial methods

**Materials and Methods**

*The study area*

Kaduna Metropolis lies between latitude 10°24'39"N and 10°36'40"N of the Equator and longitude 7°21'26"E and 7°30'00"E of the Greenwich meridian. It covers more than 355 square kilometers and elevation of 620m. Kaduna Metropolis comprises Kaduna North, Kaduna South and some parts of Igabi and Chikun Local Government Areas. The adjoining local government areas include Igabi to the north and west and Chikun to the south and east as shown in Figure 1.



**Figure 1:** Study Area

**Source:** Department of Cartography and GIS Kaduna Polytechnic, 2024.

**Methodology**

In the process of conducting this study, the following types and sources of data were used as shown on Table 1. The data used (primary and secondary) for this study originates from various sources. Satellite Imagery and Administrative map were gotten from Kaduna State Geographic Information Service (KADGIS). The geographic coordinates of event center were collected from the field using Promark 3 Global Positioning System (GPS) Receiver. The Event centres were identified through a combination of satellite imagery analysis (Google Earth, 2024), field reconnaissance, and verification with KADGIS records. Only centres hosting  $\geq 50$  people were included. A checklist was used in studying the

type of the event centres. Centres were categorized as: (1) Indoor (fully enclosed structures), (2) Outdoor (open-air spaces), or (3) Combined (both indoor and outdoor facilities), based on physical infrastructure observed during field surveys. Nearest Neighbor Analysis was carried out in the study to determine the nature of the event centres distribution pattern in the study area’s district wards using the Nearest Neighbor Analysis tool in the ArcGIS 10.8 interface which uses the estimated distance between the event centres and the total area to reveal the pattern either as clustered, random or dispersed. Kernel Density Estimation (KDE) was performed using a search radius of 1 km and cell size of 100 m to visualize density variations.

**Table 1:** Types and Sources of Data

S/N	Data Type	Instrument	Sources	Year	Expected outcome
1	Study Area boundaries	Administrative Map	Dept. of Cartography and GIS	2025	Demarcation of area extent of the study area.
2	Road network accessibility to event centres	Satellite Imagery	KADGIS	2025	Show direction and distance to event centres
3	Event Centres	Hand held GPS	Field survey	2025	Determine location of event centres
4	Categories of Event centers	Check list	Field survey	2025	Classification event centres

**Source:** Author’s Analysis, 2025.

**Results and Discussion**

**Geographical Location of Event Centres in Kaduna Metropolis**

The results of the study reveal that, fifty-seven (57) event centres were identified within Kaduna Metropolis. Figure 2 shows that the event centres are crowded in the southern part of the Metropolis, particularly around Barnawa ward of Kaduna South LGA. The result is similar to that of Hamza et’al (2023), which state

that the concentration can be attributed to the diverse cultural (different tribes), religious (Islam and Christianity; with Christianity being the more dominant) and social characteristics of the inhabitants which has made the place a busier social and economic hub when compared to other parts of the study area while the northern part of the Metropolis where the distribution is sparsely concentrated.

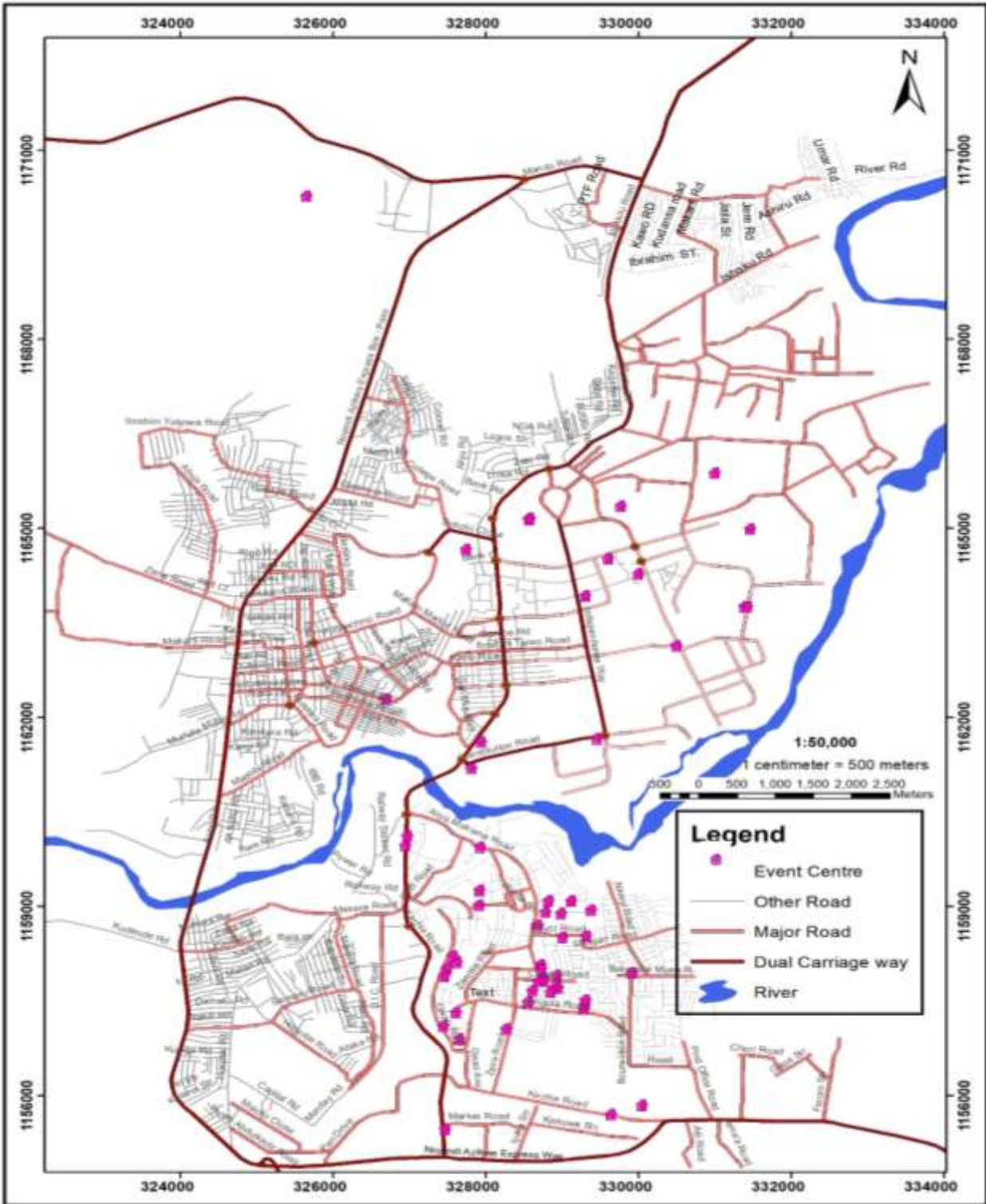


Figure 2: Location of Event Centres in Kaduna Metropolis

Source: Author's Analysis, 2025.

### Categories of Event Centres within the Study Area

The study was able to classification of event centres in to three (3), which includes; indoor

event centres, outdoor event centres and those with both indoor/outdoor event centres as presented in figure 3.

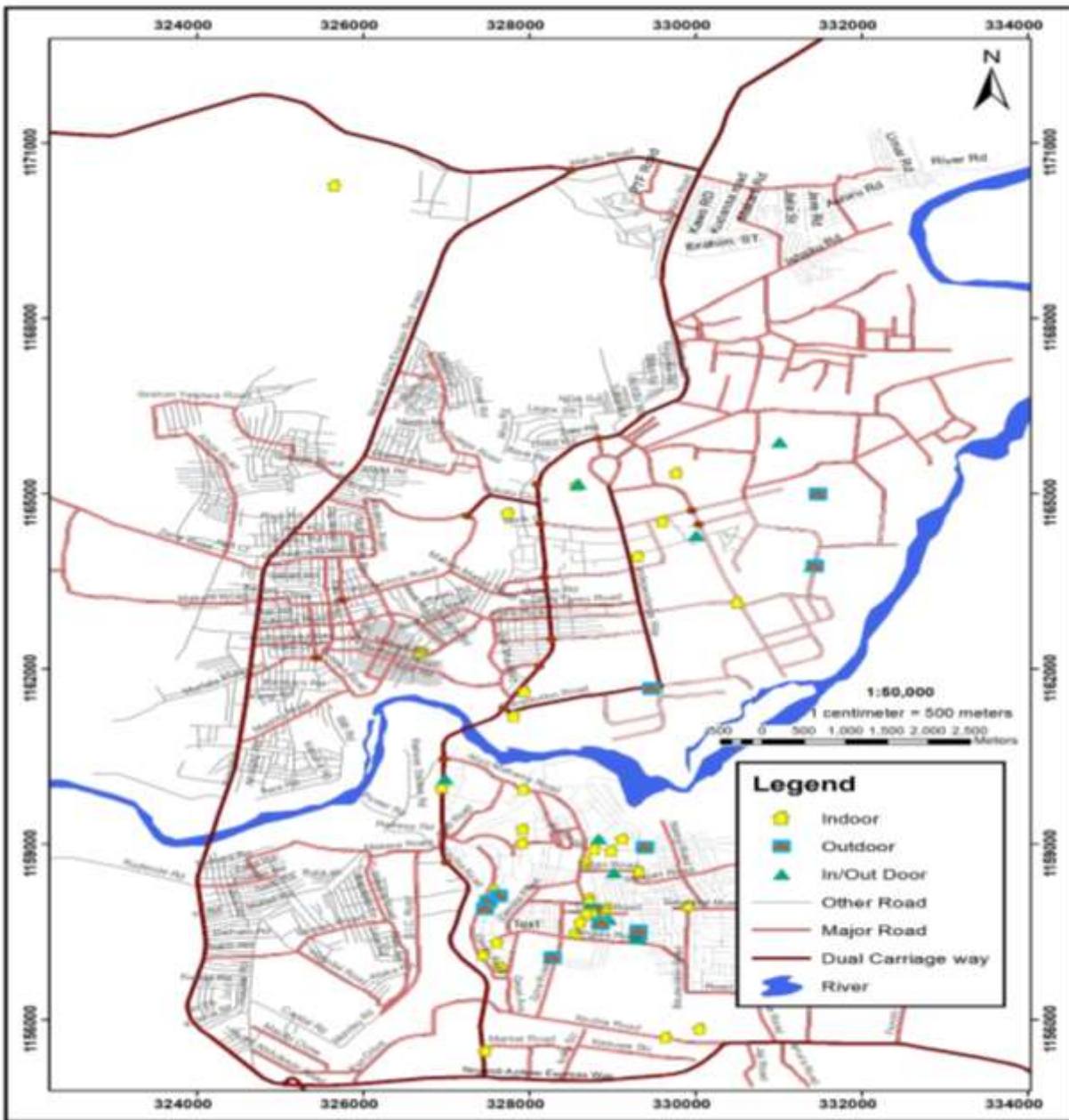


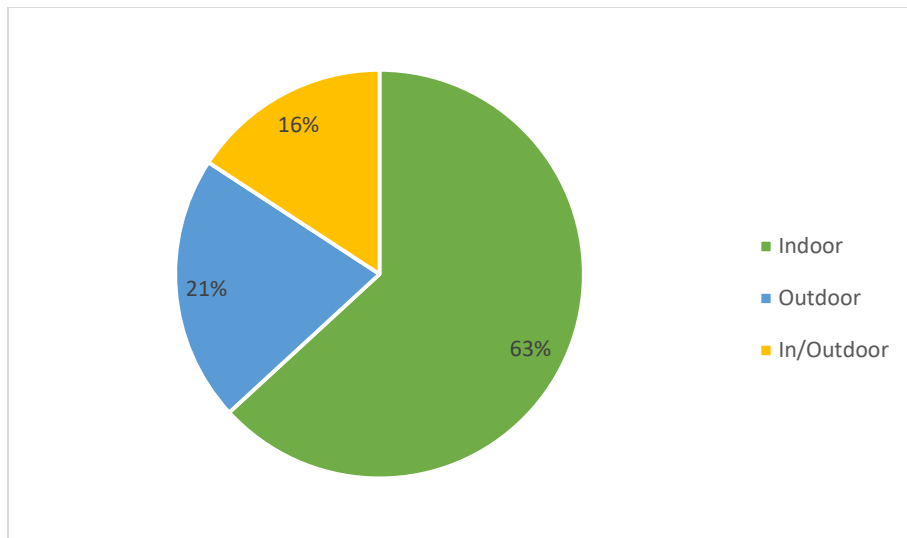
Figure 3: Categories of Event Centres in Kaduna Metropolis

Source: Author's Analysis, 2025.

The category result reveals that, the indoor event centres are mostly located across the whole part of the Metropolis usually along major roads due to the need for easy accessibility. However, the outdoor event centres and the indoor/outdoor event centres are located mostly around the southern part of the study area. This is due to the possibility of a

tighter competition between the various event centres due to their high numbers which further leads to the need to offer more variety of the event centres (indoor or outdoor event setting services to their clients).

The indoor account for 63.21% (thirty-six (36) out of the total (57) event centres), outdoor covered 21% (12 event centres) and indoor/outdoor event centres occupied 16% amounting to 9 event centres, as shown in figure 4.



**Figure 4:** Event Centres According to their Categories  
**Source:** Author's Analysis, 2025.

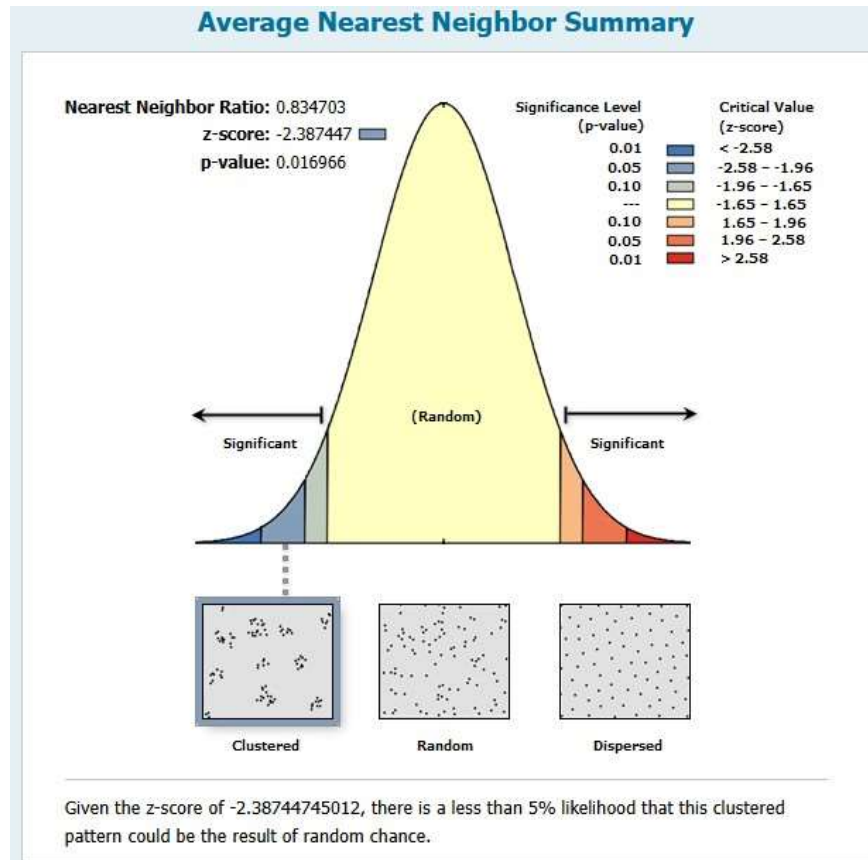
This implies that majority of the event centres identified are often in-house where the events are mostly held in an enclosed space, either a walled enclosure or within an erected canopy; the presence of this type of event centre can be attributed to the fact that clients mostly prefer enclosed spaces so as to enable them easily modify the form of decoration, enjoy more acoustics and avoid any form of unfavorable weather conditions. However, outdoor event centres are not so often utilized as compared to the indoor event centres due to the absence of these peculiarities.

#### ***Distribution Pattern of Event Centres across the Study Area***

The result of the Nearest Neighbor Analysis carried out to ascertain the distribution pattern of event centres within the study area based on the average distance from each event centre to the nearest neighboring one shows that the event centres are distributed in a clustered pattern all over the study area. This is with reference to the result of the nearest neighbor ratio of 0.834786, a p-value of 0.017021 and a z-score of -2.386249 at a 0.05 significant level in the assumption that there is less than 5% likelihood

of this dispersed pattern as a result of random chance as illustrated in the Figure 5. According to Clark and Evans (1954), if the index (average

nearest neighbor ratio) is less than 1, the pattern exhibits clustering. If the index is greater than 1, the pattern is toward dispersion.



**Figure 5:** Nearest Neighbor Analysis of Event Centers  
**Source:** Author's Analysis, 2025.

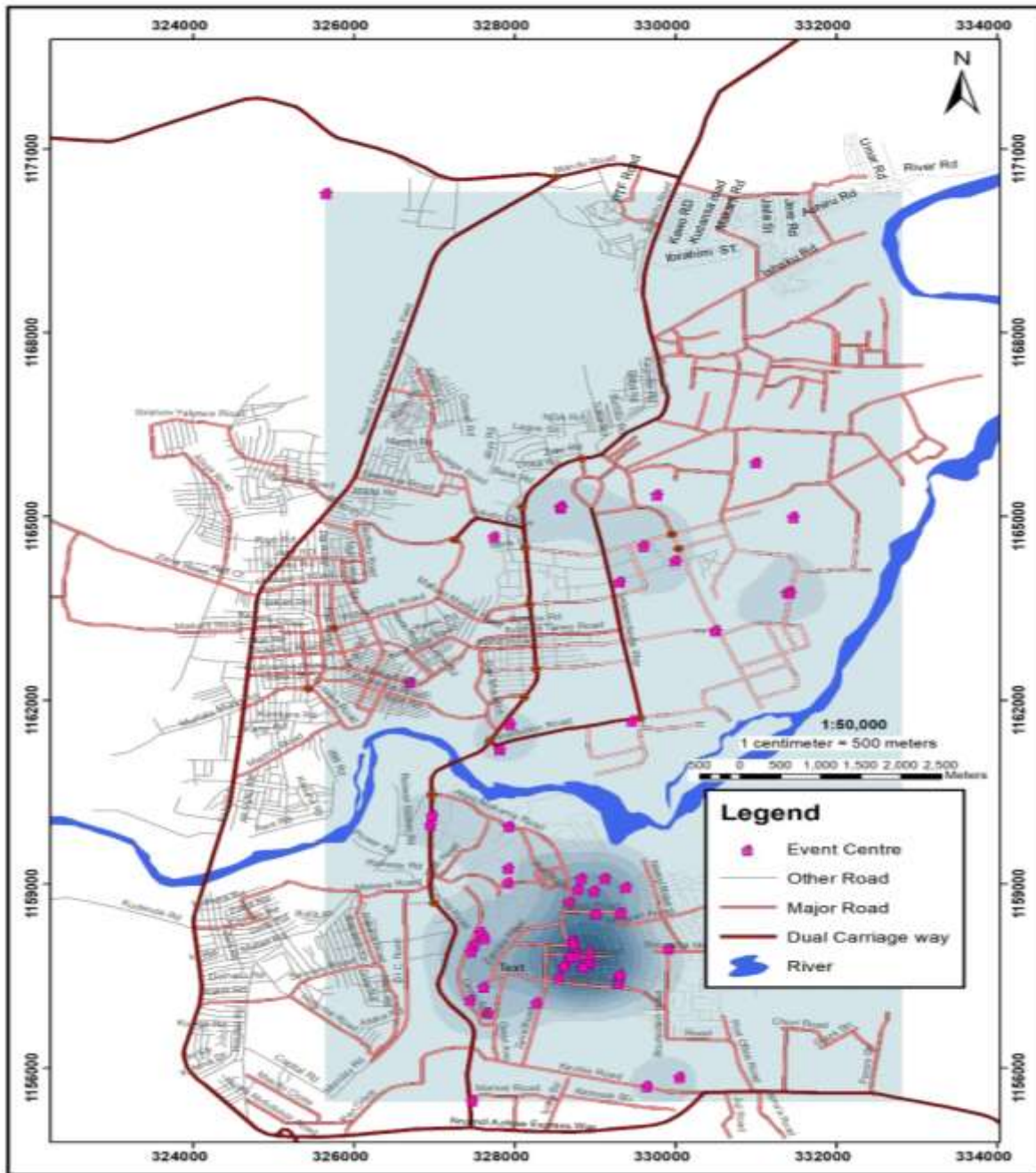
This clustered distribution can be attributed to the fact that the event centres are situated in locations that offer favorable market and consumer conditions that will help boost patronage. Hence, locations like Barnawa and Unguwar Rimi have more presence of event centres due to their advantageous characteristics.

**Heat Map Analysis of Event Centres across the Study Area**

The Heat map Analysis (Kernel Density Estimation) was employed to visualize the distribution pattern of the event centres in the study area by calculating a magnitude-per-unit area from the event centres using a kernel function to fit a smoothly tapered surface to each point. The results showed a variation in the density levels ranging from as low 1.1016 – 3.305 represented in lighter color shades to as high as 4.406 – 9.915 represented in darker color shades as illustrated in figure 6. This revealed that the areas located around the southern axis of the

study area, enjoy far more access to quite a significant number of event centres, compared to the northern axis as illustrated in which could be attributed to the variations in the social construct of the different parts of the Metropolis. The findings are similar to that of Deshe et'al.,

(2023), whom worked on the distribution of transformer in Kaduna south LGA. Their finding also shows places with dense shades have the highest number of transformers in the study area.



**Figure 6:** Kernel Density Analysis of Event Centres

Source: Author's Analysis, 2025.

### Conclusion

The study reveals that event centres in Kaduna Metropolis are unevenly distributed, with a significant concentration in the southern sector, driven by demographic diversity and socio-

economic activities. Indoor event centres dominate the landscape, emphasizing client preferences for enclosed, customizable spaces protected from weather conditions. The clustered distribution pattern suggests strategic

location choices to maximize accessibility and market potential, focused around major roads and commercial hubs. This spatial arrangement highlights disparities in availability and access, particularly between the south and north of the metropolis. Understanding these dynamics is crucial for policymakers and urban planners aiming to enhance event infrastructure, promote balanced urban growth, and cater to the cultural and social needs of diverse communities within Kaduna Metropolis. Lastly, the study recommends that Urban planners and policymakers should prioritize the development of event centres in the northern parts of Kaduna Metropolis to foster equitable access and stimulate economic activities across the entire metropolis. Also, the continuous monitoring and spatial analysis using GIS should be institutionalized to track changes in event centre distribution and demand, enabling proactive infrastructure adjustments.

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