

# Application of Geographic Information System for Hotels Registration in Bauchi Metropolis, Bauchi State

Esther Olaitan Adebitan\*, Murtala Mohammed Alamai\*\*, Shuaibu Umar\*\*\*

## Abstract

Hotels are high foreign exchange earners. Growth in local and especially international patronage of hotels facilities are directly tied to their ratings or classifications and international. A visibility. In Bauchi State, the NTDC is responsible for rating and classifying hotels facilities based on set out criteria. While Countries like South Africa, Kenya, Tunisia and Morocco have well-functioning and market-based hotel rating systems, Nigeria currently do not have a uniform rating and classification system. Comparison between the list of hotels facilities available within Bauchi metropolis and the physical hotels facilities within the metropolis shows that many hotels' facilities have not been captured in the NTDC's database of hotels facilities. Use of digital technologies such as the Geographic Information System (GIS) applications and exploitation are being used to solve this kind of problem. It is assumed that non deployment of the GIS technology may be responsible for the inability of the NTDC to carry out its statutory responsibility of rating and classification of hotels facilities within Bauchi metropolis. The implication of this scenario includes lack of proper classification and grading of hotels facilities in the State, poor statistics of established Hotels in the state which leads to revenue loss and lack of a platform or portal that is used by the NTDC to collate, asses as well as evaluate data and information on hotels and similar establishments. The objectives of this research included Identifying and undertaking locations census of hotels facilities through the use of GIS within Bauchi metropolis, Compiling, collating and grouping of hotels according to facility information for possible rating and classification based on NTDC Classification standard in Bauchi State. The results of this research include creation of an electronic template that guides and stipulates conditions for classification of Hotels in the state as well as facilities and equipment's needed, creation of portal that acts as a data base for the regulators of the industry to monitor and asses performance of the sector in the state under review as well as creation of a one stop data bank for accessing information on grading system and classification procedures of hotels and similar enterprises provided for both domestic and international tourists.

**Keywords:** Geographic Information System, Hotels Facilities, Registration, Bauchi Metropolis

## INTRODUCTION

Hotels serve as crucial economic drivers in the majority of countries worldwide (Al Saleem & Al-Juboori, 2013). In addition to their direct economic effects, the hospitality industry sectors also generate indirect social and environmental influences that contribute to the overall development of the nation. Hotels play a significant role as top foreign exchange earners (Anderson & Han, 2016). The growth in local and particularly international patronage of hotels facilities is closely linked to their ratings or classifications and their international visibility. Hotels facilities ratings and online promotion help potential tourists and guests to make informed hotels' bookings and choices of tourism facilities. Rating, classifying and projecting hotels facilities have very many socio-economic benefits. In Bauchi State, the process of hotels facilities rating and classification begins with hotels registration with the Nigerian Tourism Development Corporation (NTDC). The NTDC is responsible for rating and classifying hotels facilities based on set out criteria. South Africa, Kenya, Tunisia, and Morocco have well-established and market-based hotel rating systems. However, Nigeria lacks a similar robust system for evaluating and rating hotels (Agbayekhai, Ishola, Jegede & Oyinkolade, 2019).

A Geographic Information System (GIS) is a comprehensive software and data infrastructure that is specifically designed to handle and manage location-based information, analyze spatial connections, and simulate spatial processes. By integrating traditional database functionalities like querying and statistical analysis with specialized mapping and geographic analytical features, GIS stands out from conventional information systems. Its distinctive combination of capabilities empowers

\* Departments of Hospitality Management, The Federal Polytechnic Bauchi Nigeria. Email: adebitaneo@fptb.edu.ng

\*\* Tourism Management Technology, The Federal Polytechnic Bauchi Nigeria.

\*\*\* Survey and Geoinformatics, The Federal Polytechnic Bauchi Nigeria.

organizations to gain insights into events, predict outcomes, and develop strategic policies. Therefore, GIS goes beyond simple digital mapping and serves as a robust decision-making tool. While map creation and geographic analysis have been practiced for a long time, GIS surpasses human approaches by delivering more efficient and rapid execution of these tasks.

GIS is a technology enabled integrated system that is widely utilized in a variety of applications including tourism planning, environmental management, agriculture, and urban development. By providing dynamic and digital maps, the GIS application has helped to the present system enhancement development. The field of Geographic Information System (GIS) is rapidly expanding, facilitating the creation of applications that effectively manage and integrate geographic data alongside various other forms of media (Jovanovic & Njegus, 2008).

GIS applications, according to Mahesh K. (2017), include Managing geographical operations and inventories, resource allocation that is rational, effective, and efficient Monitoring and comprehending observable geographical distributions of qualities, understanding the importance of location, recognizing the impact of place, comprehending processes within both natural and human environments, and prescribing strategies for environmental maintenance and conservation are crucial aspects of this comprehension.

Geographic Information Systems (GIS) offer valuable information applicable to various fields, including the travel and hospitality industry. Specifically, GIS Applications in the Hospitality Industry delves into how GIS is utilized in leisure travel, focusing on aspects such as bookings and location-based services. The utilization of GIS technology presents significant opportunities for creating advanced tourism applications centered around maps.

Hotels facilities are commonly assessed and rated according to established local or international standards. These ratings serve as a valuable reference for attracting attention and informing potential customers about the quality of the facilities, standard of services, and overall experience they can expect (Chikosha & Vutete, 2012; Australian Motoring Services, 2014; UNWTO, 2014; Qvclub, 2015). These evaluations provide a useful guide for travelers when selecting accommodations,

considering factors such as price, location, and amenities. Such considerations are often influenced by the purpose of the trip and can have a significant impact on purchasing decisions. Grading Systems are used to differentiate the various quality levels of hospitality facilities (Akukwe & Odum, 2014). They offer prospective clients a foundation for making informed judgments regarding the amenities, facilities, and services of specific hotels establishments, empowering travelers to select the level of quality they desire in their accommodations. Comparison between the list and the physical structures of hotels facilities within Bauchi metropolis however shows that many hotels facilities have not been captured in the NTDC hotels facilities database. This is of great concern because it infers that, hotels facilities within Bauchi metropolis are either operating illegally in the State or are not rated and classified for them to become visible for international patronage.

## STATEMENT OF PROBLEM

The lack of reliable statistics and star rating information within Nigeria's hotel industry is widely recognized (Bankole, 2014; UNWTO, 2006; Nwosu, 2016). Additionally, there is insufficient data available regarding the total number of hotels in the country (Nwosu, 2016). Although the Nigerian Tourism Development Corporation (NTDC), as the primary regulatory body for hotels, has established national hotel classification and grading standards, these standards have not been consistently applied. Consequently, many hotels have taken it upon themselves to assign star ratings, with a significant number claiming to be 4- or 5-star establishments (Itayemi, 2013). For now, there is no uniform National rating and classification system (Adeyemi, 2013; Akukwe & Odum, 2014; Agbayekhai et al., 2019) rather, individual States within the country have adopted their own rating and classification systems. With rapid expansion within the hotels and tourism sector, identifying and compelling hotels facilities to register with the NTDC can be cumbersome. In this vein, deployment of digital technology such as the GIS simplifies the system. It is assumed that non deployment of the GIS technology may be responsible for the inability of the NTDC to carry out its statutory responsibility of rating and classification of hotels facilities within Bauchi metropolis. The implication of this scenario include that because of the lack of proper rating and classification of Hotels facilities, there is poor statistics of established

hotels in the State which leads to revenue loss since the hotels facilities cannot be accurately taxed; there is a lack of a platform or portal that is used by the NTDC to collate, assess or evaluate data and information on Hotels facilities and similar establishments; it also implies that the State lacks a database of rated and classified hotels establishments according to standards, facilities, mode of service and other necessary requirements which enhances productivity and revenue generation for the State and the industry.

This study was designed to generate an initial compendium and description of hotels facilities within the Bauchi metropolis which consequently can be used by the NTDC to rate and classify these facilities within the State with the intent to mitigate above enumerated consequences.

## OBJECTIVES OF THE STUDY

The main objective of this research is to apply the Geographic Information System for hotels facilities registration within Bauchi metropolis, Bauchi State. This was achieved through the following specific objectives;

- Identifying and undertaking a census locations of hotels facilities through the use of GIS within Bauchi metropolis.
- Compiling, collating and grouping of hotels according to facility information for possible rating and classification based on NTDC Classification standard in Bauchi State.

## RESEARCH QUESTIONS

- Where, what types of hotels and how are they found and located technologically in Bauchi metropolis?
- How are the located hotels compiled, grouped, classified and graded for standardization?

## LITERATURE REVIEW

### Hotel Industry

The hotel industry is a sector within the broader hospitality industry, which falls under the domain of travel and tourism (Scott-Halsell, Blum & Huffman, 2008). Internationally, hotels are recognized as public establishments that offer

a reasonable level of comfort, convenience, and quality (Durodola, 2009). According to the National Bureau of Statistics (2015), hotels come in various styles and provide a range of services, catering to different budgets and preferences. A hotel is generally considered a commercial entity that offers accommodations, dining facilities, and other guest services. Classification of hotels typically relies on several common criteria, as depicted in Fig. 2.

### Concept of Hotels Rating

The concept of 'hotel rating' is synonymous with terms such as 'hotel categorization,' 'hotel grading,' and 'hotel classification.' These terms are used to evaluate hotels based on their available facilities, services, and standards (UNWTO, 2014). In many countries, a scale of one to five stars is commonly employed to rate hotel accommodations, with one star representing basic facilities and comfort standards, and five stars indicating luxury in both facilities and services (Kiplagat, Makinde & Obwoyere, 2014). Hotel rating serves as a tool for standardization, aiming to bridge the expectations of guests with the actual experiences they will encounter in terms of hotel amenities and services by providing advance information on what to expect.

Currently, there is no universally applicable rating system for hotel accommodations. The diversity and inconsistency in hotel rating systems can have an impact on the quality of facilities and services provided (Kiplagat, Makinde & Obwoyere, 2014). Various categories of room rates exist, including rack rates, commercial rates, corporate rates, government rates, group rates, airline rates, package rates, children's rates, American plans, Modified American plans, European plans, and complimentary rates.

### Accommodation Types and Products

The hospitality industry offers a wide range of accommodations to cater to the needs of both business and leisure travelers. According to the National Bureau of Statistics (2015), these include various types of hotels such as city center hotels, airport hotels, suburban hotels, highway motels, convention hotels, commercial hotels, boutique hotels, resort hotels, spa hotels, and casino hotels. Additionally, there are bed and breakfast hotels,

guesthouses, cabins, chalets, villas, extended-stay hotels, timeshares, vacation ownerships, and historic conversion hotels. Some countries also offer unique and distinctive accommodations with special characteristics, such as ice hotels, capsule hotels, cave hotels, treehouse hotels, and underwater/floating hotels (UNWTO, 2015).

Accommodation stands as a core product of hotels and serves as one of their primary revenue sources. It encompasses rooms and associated services that hotel guests consume during their stay. These accommodation products include different types of rooms, beds, and room rates (UNWTO, 2015).

Hotels offer a variety of room types, each with its own grade, features, and functions. According to the National Bureau of Statistics (2015), guests can choose from different types of guest rooms depending on the hotel's rating level. It is crucial for hotel guest rooms to provide utmost comfort to users, as noted by Andrews (2008). Room types may include single rooms, twin rooms, double-double rooms (twin or queen), triple rooms, Hollywood twin rooms, studio/murphy rooms, executive rooms, suites, presidential suites, and penthouse suites. Other room types encompass villas, duplex rooms, parlors, balcony rooms, accessible rooms, adjoining rooms, connecting rooms, and efficiency rooms (UNWTO, 2015).

Hotels offer various categories of room rates to attract a diverse range of guests and maintain high occupancy rates. These rates include rack rates, corporate rates, commercial rates, government rates, airline rates, group rates, package rates, children's rates, American plans, Modified American plans, European plans, and complimentary rates (UNWTO, 2015).

Internationally and locally, hotels may undergo classification, rating, or grading based on features such as size, design, price, location, market segment, function, levels of service, and distinctiveness of the property (Chu, 2014; Itayemi, 2013). However, in Nigeria, there is currently no harmonized national system for the classification, grading, and star rating of hotels. As a result, individual state hotel management boards have adopted their own grading systems, leading to variations in classifications. For instance, in Bauchi State, a location criterion has been adopted, with five different location classifications equating to star ratings: "International" (five-star), "National" (four-star), "Urban" (three-star), "Sub-urban" (two-star), and "Rural" (one-star)

classifications (NTDC Bauchi).

## Geographic Information System in Hospitality

A proficient GIS program possesses the capability to analyze and integrate geographic data from various sources into a map project. Many countries boast extensive geographic data, often made available to the public by governments. GIS products typically feature map file databases, obtainable from commercial vendors or government entities. Additionally, global positioning units collect field data by tying location coordinates (latitude and longitude) to specific features such as health institutions (ESRI, 2011).

The field of Geographic Information Systems (GIS) is constantly evolving. GIS systems are specifically designed to handle data that is spatially referenced or based on geographic coordinates. These systems have the capability to receive, manage, analyze, and display such data (Charter, 2016). The first computer-based GIS application, known as CGIS (Canadian GIS), was implemented by the Department of Energy, Mining and Resources in Ottawa, Ontario, Canada, in 1967 (Irwansyah, 2016).

GIS technology, an integrated system, finds wide-ranging applications in fields such as tourism planning, environmental management, agriculture, and urban development. Through dynamic and digital mapping, GIS applications have significantly enhanced system development. It is a fast-growing field that enables the creation of applications managing geographic data alongside other media types (Jovanovic & Njegus, 2008). According to Mahesh K. (2017), GIS applications encompass managing geographical operations and inventories, rational and effective resource allocation, monitoring and understanding observable geographical distributions, comprehending the significance of location, discerning the impact of place, understanding processes in natural and human environments, and prescribing strategies for environmental maintenance and conservation.

Azizur (2010) conducted a case study in Sundarbans, Bangladesh, the world's largest mangrove forest, to develop an ecotourism plan for the region. The study utilized GIS as a decision-making tool to assess land use changes in the Sundarbans over 33 years (1977-2010)

using satellite imagery. It was found that land use had changed due to human activities and climate change, impacting the forest density. Khwanruthai and Yuji (2011) employed GIS and the Analytical Hierarchy Process (AHP) to identify and prioritize potential ecotourism sites in Surat Thani Province, Thailand. Terrestrial ecosystem indicators, including landscape/naturalness, wildlife, topography, accessibility, and community traits, were used. Nine criteria, such as visibility and proximity to cultural sites, were considered for ecotourism evaluation. AHP calculated component and class weights, demonstrating the effectiveness of GIS in ecotourism planning. Ting (2012) conducted a GIS-based analysis of hotel location choice in Manhattan from 1822 to 2012. The study aimed to identify location factors influencing hotel performance. Spatial statistical approaches and multiple regressions were used to detect spatial-temporal trends and correlations between location characteristics and hotel attributes. The findings highlight the importance of geographical elements in hotel site decision-making.

In addition, Surya et al. (2020) developed a web- and mobile-based GIS for places of worship information (GPWI) in Bukittinggi, Indonesia, to support Halal tourism. The GPWI allows Muslim tourists to find mosques and nearby amenities. It was created using Free Open-Source Software and provides mosque location, information, routes, and local transit options. This system meets the needs of Muslim tourists visiting Bukittinggi.

Equally, Azlizan et al. (2016) applied GIS mobile data collection to identify interesting places and hotels in Bandar Hilir, Malacca. The study involved data field planning, data gathering, and database construction, enhancing tourism services through GIS. While Muhamad et al. (2018) employed GIS to evaluate tourism readiness in Purwakarta Regency, Indonesia. Four readiness indicators were assessed: accessibility, amenities, ancillary services, and attractions. The study classified regions into high, medium, and low readiness categories, with tourist attractions being a key factor. GIS proved valuable for mapping spatial data and could guide tourism destination planning in various regions. Ali and Domokos (2021) combined fuzzy analytic hierarchy process (FAHP) and GIS to aid tourists in selecting optimal accommodations. Criteria like cost, distance, security, rating, and services were considered. FAHP weighted criteria, while GIS visualized ranked accommodations. The study recommended improving

cost, services, and quality to enhance attractiveness for tourists in Budapest City.

In Nigeria, Babawale Akin Adeyemi (2013) conducted a study using GIS to analyze the locational patterns of hotels in Akure, Ondo State. The research involved collecting primary data through GPS coordinates, which were used to create a point map. Secondary data, including road network maps and a list of hotels, was also utilized. GIS tools, specifically ILWIS and ArcGIS, were employed to process the data and establish a geographic database for hotel facilities. The findings revealed that hotels were distributed across Akure, with the highest concentration observed in the Oke Ijebu/Ijapo Estate area, accounting for 31.3% of the total. Interestingly, there were limited hotels in the primary business district, highlighting the value of GIS in making informed decisions regarding hotel site selection.

Another study by Ofobruku (2013) focused on the utilization of GIS technology for managing tourism attractions in Victoria Island, Lagos. The research covered a wide range of attractions such as beaches, museums, parks, resorts, hotels, restaurants, clubs, bars, cinemas, and fitness centers, as well as complementary services like police posts, clinics, and hospitals. The objective was to enhance attraction management and analyze the accessibility of these points of interest using GIS analytical tools. Geographic coordinates of these locations, along with their respective attributes, were collected to create a Geo database using ArcMap 9.3 software. Spatial statistical tools within GIS were employed to support decision-making and future planning. Central Feature analysis was utilized to model the central area encompassing tourism facilities, services, and destinations in Victoria Island.

Akukwe and Odum (2014) further highlighted GIS's role in Anambra State's tourism development, emphasizing the need for a comprehensive tourism database. They constructed a GIS database for tourism using selected highways, tourist attractions, and facilities, enhancing tourism planning and management. Whereas, Agbayekhai et al. (2019) dwelt on Ado-Ekiti's spatial analysis and distribution of hotels and tourism centers. Primary and secondary data sources were employed, including GPS coordinates for geographic locations. Sixty-three hotels and five tourism sites were surveyed, showing a prevalence of 2-star category hotels along road networks, catering to diverse socio-economic classes. The study recommended

upgrading hotel facilities to meet international standards while the tools.

In the research conducted by Adeyemi (2013), Geographic Information Systems (GIS) tools were employed to analyze the locational patterns of hotels in Akure, Ondo State. The study utilized both primary and secondary data sources. For primary data collection, a handheld Global Positioning System (GPS) receiver was used to capture the coordinates of each hotel, which were then used to generate a point map. Secondary data included the road network map of Akure obtained from the Ondo State Ministry of Urban and Physical Planning, as well as a list of hotels collected from the Ministry of Economic Planning and Budgeting's Research and Statistics Department. ILWIS (3.3) and ArcGIS software were utilized to process and analyze the data, resulting in the creation of a geographic database for hotel facilities.

## **NIGERIAN ECONOMY**

Nigeria, which is recognized as the largest economy in Africa according to the World Bank (2015), holds a prominent position as the economic powerhouse in West Africa. The hotel and tourism sector, an integral part of the hospitality industry, has played a crucial role in driving this economic growth. Nigeria boasts some of Africa's most luxurious hotel rooms, operated by international hotel chains (Industrial Development Corporation, 2014). Between 2010 and 2015, the sector experienced significant growth with the addition of 2,100 rooms (PWC, 2016). In 2013, investments in hospitality and travel in Nigeria reached N264.2 billion Naira (\$1.6 billion USD), accounting for 4.8% of total investments and surpassing the global average of 4.4% (National Bureau of Statistics, 2015). The sector's importance is further highlighted by its direct contribution of N1.56 billion Naira (\$9.4 million USD) and 1.7% to the country's Gross Domestic Product (GDP) in 2014 (Industrial Development Corporation, 2014; Oxfordbusinessgroup.com, 2015; Euromonitor, 2016; Hospitality Net, 2016).

With a 2.4% growth in GDP achieved in 2015, the Nigerian hotel industry is expected to further escalate by 5.8% annually over the next decade (National Bureau of Statistics, 2015). While Abuja boasts several international

standard hotels with ongoing construction, there remains a surging demand for affordable yet high-quality upmarket hotel accommodations (Industrial Development Corporation, 2014).

## **Hotel Accommodation Sector in Nigeria**

The hotel accommodation sector holds significant importance for both leisure and business travel in Nigeria, with rapid growth fueled by the entry of major international hotel chains (Itayemi, 2013). Despite advancements in infrastructure and superstructure, service delivery often falls short of patrons' expectations (Nasiru et al., 2003).

However, despite the sector's growth, many hotels in Nigeria operate in violation of NTDC regulations (Industrial Development Corporation, 2014). It is common practice for hotels to self-grade themselves, assuming titles such as three-star, four-star, or five-star status (Itayemi, 2013). This complexity in the Nigerian hotel industry stems from its lack of regulation, resulting in a blend of practices borrowed from various global markets in an attempt to generate revenue and attract clientele (Jovago, 2015).

## **Summary of Literature Reviewed and Gap Identified**

The literature review above has provided valuable insights into the diverse applications of Geographic Information Systems (GIS) in the tourism and hospitality industry. It is evident from the reviewed studies that GIS technology plays a pivotal role in enhancing decision-making, planning, and management within the sector. However, despite the substantial contributions made by these studies, there remains a notable gap in the literature that this study aims to address.

The identified gap centers on the absence of comprehensive GIS-based tools and systems for the registration and classification of hotels facilities in Bauchi State, Nigeria. While previous research has explored various aspects of GIS in tourism, none has specifically focused on developing a GIS platform for hotel facility registration in Bauchi metropolis.

## METHOD

To address the research questions, the study utilized an exploratory type of research through a quantitative approach with the research design being experimental in nature to gain information on the area of study being that the purpose of doing such research is to find solutions for solving a particular problem by developing new technological ways and into future advancements for hotel grading and classification.

## STUDY AREA

The research was conducted in Bauchi metropolis, situated within Bauchi State, Nigeria. Bauchi State is positioned in the North-East geopolitical zone of Nigeria. With an estimated population of approximately 4,653,066 (2006 est.), the state is located at latitude 10.3103 and longitude 9.84388, at an elevation/altitude measured in meters (Bauchi State Government, 2014).



Source: Authors Design (2023).

**Fig. 1: Map of Bauchi Metropolis in Bauchi Local Government Bauchi State Nigeria**

## RESEARCH INSTRUMENT

A structured questionnaire was administered purposely to all documented hotels at the database of Bauchi State Tourism Development Corporation and Bauchi state Ministry of Tourism as at July 2023 while some software and programmes were used for the GIS data mapping and collation.

## DATA COLLECTION SYSTEMS

Reconnaissance survey was carried out in this work in order to become familiar with the sites. The inventory of hotels was carried out physically through administering research questionnaire that contained information to be

ticked according to the types of facilities available in such hotels which will act as the tool to be analysed to see if the hotel meets up with the criteria of its rating or not (NTDC guidelines for Hotel rating and classification 2010) to hotel managers and proprietors respectively, equally a Topographic Survey was done in order to acquire the ground coordinates of the hotel's facilities. It was achieved with Global Positioning System (GPS) technique, as well as recording of attribute data of the coordinates. Mapping was also done using QGIS. The collected data from QField Cloud, in a format compatible with QGIS, was exported. Relevant analysis and visualization were performed on the collected data to derive insights. Finally, QGIS was used to show the spatial distribution of the hotels in the map.

## DATA ANALYSIS AND RESULT

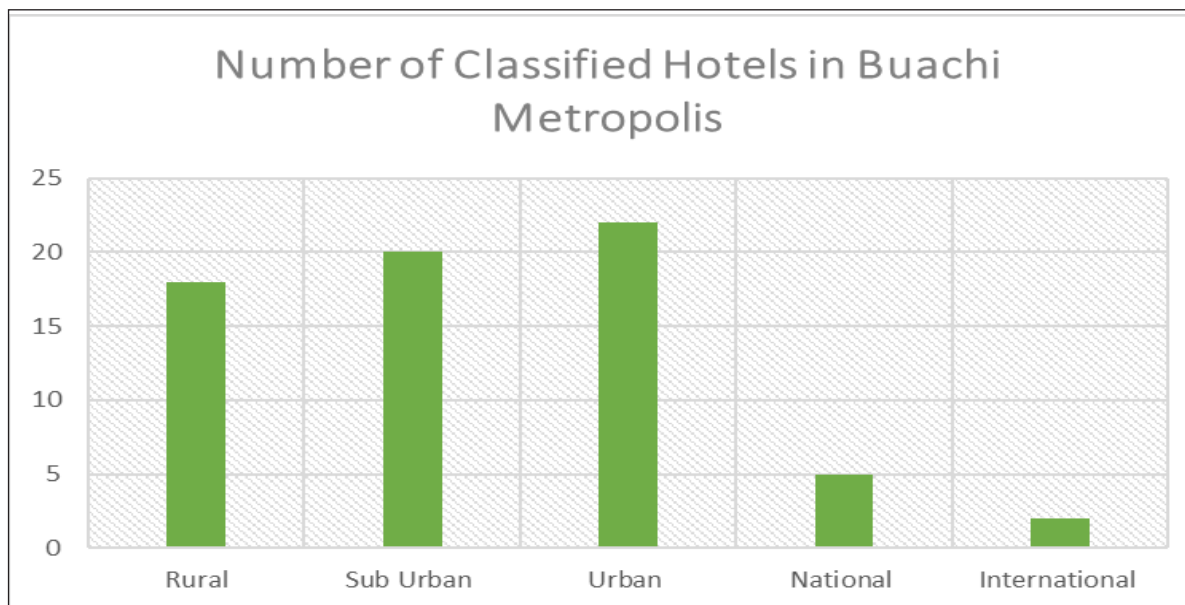
Research question 1 (Where, what types of hotels and how are they found and located technologically in Bauchi metropolis?)

The primary objective of this project was to comprehensively assess the current status and characteristics of hotels within Bauchi metropolis, as a growing urban center in Bauchi state, which has witnessed significant development in the hospitality industry. The field data collection aimed to gather insights into the distribution, facilities, services, and overall quality of these hotels.

The data collection process involved the utilization of

QField Cloud, a powerful tool for efficient and accurate data collection. By employing this technology, we aimed to streamline the data gathering process, enhance data accuracy, and facilitate real-time synchronization of information between field devices and the cloud server.

The field data collected was exported and was used to classify the hotels into different classifications that is applied to hotels in Nigeria where the lowest equivalent to one star is ascribed to be rural, the one that follows which is equivalent to two star is called Sub Urban, followed closely by Urban which connotes the three star rating, then the four star rating is being called National and finally the 5 star called international. This is shown in Fig. 2 with the corresponding numbers found in the city.

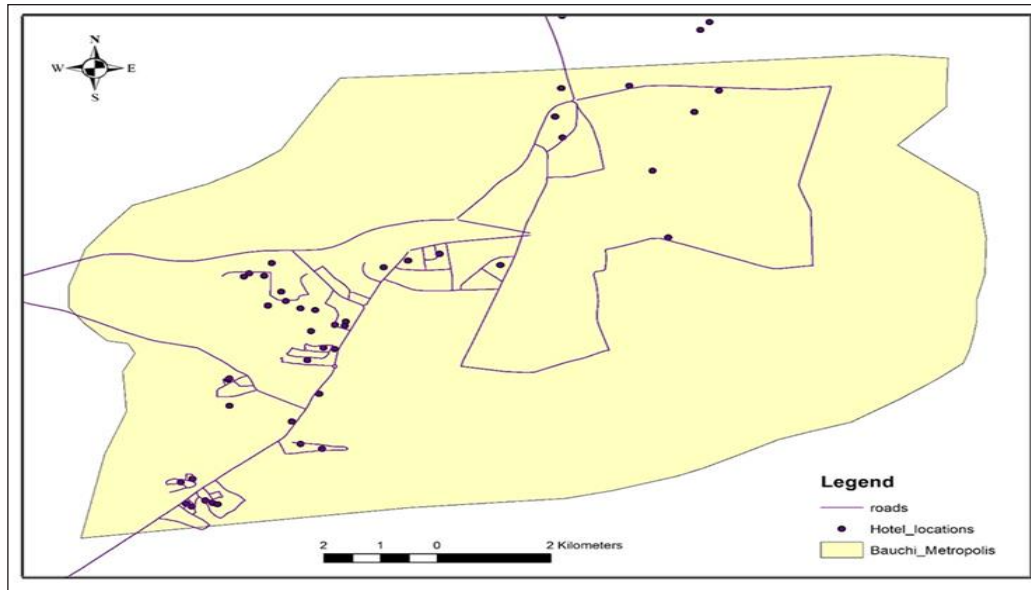


Source: Field Survey (2023).

**Fig. 2: Numbers and Ratings of Classified Hotels in Bauchi Metropolis**

From the graph in figure one above it will be observed that the findings of the research indicates that there about 18 classified Rural hotels within the metropolis, 20, Sub Urban hotels, 23 Urban hotels which has the highest

quantity, 5 numbers of national classified hotels and 2 International standard hotels within the 67 identified, registered with the state ministry of Tourism in the metropolis as at October 2023.



Source: Field Studies (2023).

**Fig. 3: Map Showing Spatial Distribution and Location of Hotels in Bauchi Metropolis**

*Research question 2 (How are the located hotels compiled, grouped, classified and graded for standardization?)*

A total of 67 hotels were assessed and analysed, with each hotel falling into one of the five classification categories. And a breakdown of the number of hotels in each category are listed below:

- *Rural Classified Hotels:* There are 18 hotels classified as rural, which are often budget-friendly options with basic amenities and services.
- *Sub Urban Classified Hotels:* There are 20 hotels classified as Sub Urban, providing slightly better accommodations and services compared to 1-star hotels.
- *Urban Classified Hotels:* There are 22 hotels classified as Sub Urban, representing mid-range hotels that offer more facilities and services to guests.
- *National Classified Hotels:* There are 5 hotels classified as National, indicating a higher level of luxury, comfort, and services.
- *International Classified Hotels:* There are 2 hotels classified as International, representing the most luxurious and upscale accommodations with extensive amenities and services.

This distribution highlights the variety of hotel options available in Bauchi metropolis, catering to different types of travelers and their preferences. The prevalence of urban classified hotels suggests that the city has a substantial range of mid-range accommodations, catering to a diverse clientele.

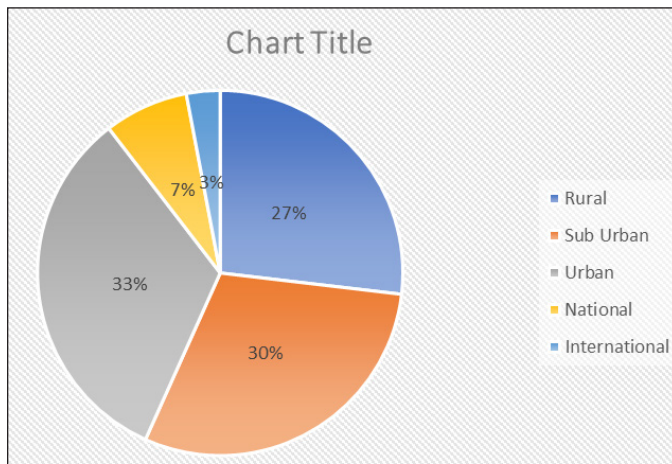
In conclusion, the data in Table 1 provides valuable insights into the hotel landscape of Bauchi metropolis, showcasing the diverse range of accommodations available to residents and visitors, each catering to varying levels of comfort and luxury.

The cross-tabulation provides information about the distribution of hotel categories within specific locations. The Fig. 2 shows the number and percentage of hotels in each category (Rural, Sub Urban, Urban, National and International) present in different locations in Bauchi.

From the analysis, we can draw the following key points:

- *Location Distribution:* The table showcases the variety of locations where hotels are situated in Bauchi. This distribution includes areas such as “Along Jos Road,” “Gombe Road,” “New GRA Bauchi,” “Kudum Siyawa,” “Sunday Awoniyi Road,” “Rafin Zurfi,” and others. Each location has its own unique combination of hotel categories (Fig. 3).

- **Hotel Category Percentage Distribution:** The majority of hotels fall within the “Sub Urban” and “Urban” categories, contributing to around 33% and 30% of the total hotels respectively. The “Rural” hotels also have a significant presence, accounting for 27% of the total with national having 7% and international having a meagre 3% out of the total as shown in Fig. 4.



Source: Field Survey (2023).

**Fig. 4: Hotel Category Percentage Distribution**

- **Location-Specific Hotel Category:** When analyzing the distribution of hotel categories in each location, it's interesting to note that the “Sub Urban” hotels dominate several areas, such as “Along Maiduguri Bypass,” “Behind Faith Revival Chapel,” and “Behind Yelwa Tudu market.” Meanwhile, “Urban” hotels are prominent around “Behind Alti Hotel, Rafin Zurfi”, “Behind Old Dass Park, New GRA,” and Some parts of “Old GRA”.
- **International Hotel Concentration:** It's noteworthy that there are only two “International” classified hotels in the dataset, making up 3.0% of the total. Both of these are located in “New GRA” and “Old GRA area Bauchi.”
- **Variability in Categories:** While some locations have hotels from multiple categories, some areas are dominated by specific categories. For instance, “Old GRA” and “New GRA” have “Urban” hotels as the sole category.

In summary, the analysis provides insights into the distribution of hotel categories across different locations in Bauchi. It reveals trends such as the prevalence of “Urban” hotels in certain areas and the dominance of

“Sub Urban” and “Urban” hotels in the overall distribution. This information can be useful for stakeholders in the hospitality industry, urban planning, and tourism management to understand the spatial distribution of hotels and make informed decisions.

Also, the result from the analysis that investigated the relationship between various facilities of hotels (predictor variables) and their corresponding hotel ratings (dependent variable) revealed that the model seems to be a perfect fit according to the provided statistics, with all the predictor variables having very low p-values. This suggests that the facilities such as bedrooms, bathrooms, lighting, restaurant, water, staff, laundry service, housekeeping, etc., have a statistically significant impact on the hotel ratings (dependent variable). However, the coefficients and the effect sizes should also be taken into account to understand the practical significance of these relationships.

## CONCLUSION

The spatial distribution of hotels in Bauchi metropolis, as depicted on the map (Fig. 3) offers valuable insights into the urban development, economic activities, and potentially the tourism sector of the area. The distribution appears to be clustered in certain regions while showing variations in density across the metropolis. This spatial pattern could be attributed to several factors, including urban planning, infrastructure development, economic dynamics, and tourist attractions.

The clustering of hotels in specific areas may indicate the presence of commercial centers, business districts, or areas with high tourism potential. These regions are likely to attract a greater number of visitors, both for business and leisure purposes, leading to a higher demand for accommodation services. This clustering effect could be further reinforced by the presence of amenities such as conference centers, shopping districts, and cultural attractions, which often draw visitors and subsequently lead to the establishment of hotels in proximity.

Conversely, areas with lower hotel density are primarily residential and lack the necessary infrastructure and attractions to support a thriving hospitality industry. These regions could potentially represent areas for future development or investment in terms of urban planning and tourism promotion.

The spatial distribution of hotels also reflects the city's economic landscape. The concentration of hotels in certain zones suggests economic vibrancy and growth, as it implies the presence of industries, commerce, and events that drive the need for accommodation services. This can contribute to job creation, increased economic activity, and overall development in those specific areas.

Additionally, the map provides insights into the effectiveness of urban planning policies. If the distribution is balanced and evenly spread across the metropolis, it could indicate successful zoning regulations and city management. On the other hand, if there are irregularities in distribution, it might signal the need for adjustments in terms of infrastructure development and urban planning strategies to ensure equitable distribution of economic benefits.

Finally, the spatial distribution of hotels in Bauchi metropolis conveys a wealth of information about the city's economic dynamics, urban planning efficacy, and potential tourist hotspots. The clustering of hotels in certain areas reflects the concentration of economic activities, while areas with sparse hotel presence might indicate opportunities for further development. This map serves as a valuable resource for city planners, policymakers, and investors to strategically allocate resources, promote tourism, and enhance overall urban development.

## RECOMMENDATIONS

Based on the spatial distribution depicted on the map, a few recommendations and implications emerge from the study:

- *Diversification of Locations:* The map highlights opportunities for diversifying the distribution of hotels. It will be beneficial to encourage hotel development in less dense areas to promote equitable urban growth and reduce potential strains on infrastructure.
- *Strategic Development:* Understanding clustering patterns can guide future development strategies. For instance, investing in infrastructure and amenities around hotel clusters can enhance the overall visitor experience and boost the local economy.
- *Tourism Promotion:* Areas with fewer hotels will present opportunities for tourism promotion

and development. Creating incentives for hotel establishment in such zones could lead to the expansion of the hospitality industry and increased tourism revenue.

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