# EMERGING TECHNOLOGY ON TOWN AND CITY PLANNING: EXPLORING THE ROLES OF ARTIFICIAL INTELLIGENCE (AI) IN DATA COLLECTION AND ANALYSIS FOR EFFECTIVE TOWN PLANNING IN NIGERIA

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## ABSTRACT

*The study examined the emerging technology on town and city planning: exploring the roles of artificial intelligence (AI) in data collection and analysis for effective town planning in Nigeria. In carrying out the study, a descriptive survey design was adopted and the study was carried out in two states in Nigeria, (Akwa Ibom State and Anambra State). The targeted population for the study comprised all environmental scientists and computer scientist in Nigeria. A stratified random sampling technique was used to select 25 environmental scientists and 15 computer scientist each from both State and Abia States and that gave a total of 80 respondents used for the study. The instrument used for data collection was a structured questionnaire titled "Artificial Intelligence and Emerging Technology for Service and Production Questionnaire (AIETSPQ)". Face and content validation of the instrument was carried out by an expert in test, measurement, and evaluation in order to ensure that the instrument has the accuracy, appropriateness, and completeness for the study under consideration. The reliability coefficient obtained was 0.91, and this was high enough to justify the use of the instrument. The researcher subjected the data generated for this study to appropriate statistical technique such descriptive statistics to answer research questions. The findings exposed that "Improving Infrastructure Planning" was the most prominent roles of artificial intelligence (AI) among other roles in analyzing data on town and city planning. The findings also revealed "Traffic Sensors aided Predictive Analytics for Traffic Flow Optimization" was the highest roles of artificial intelligence (AI) in data collection on town and city planning. Finally, it also revealed that "Data-Driven Insights" was the highest role of artificial intelligence (AI) in generating wise decision making in town and city planning. The study concluded that as cities face challenges, AI is crucial for creating adaptable, resilient, and future-ready environments, meeting population demands effectively. One of the recommendations was that urban planners should integrate AI-based tools into planning processes to enhance data collection, analysis, and predictive modeling for better decision-making and optimized resource allocation.*

**Keywords: Emerging Technology, Artificial Intelligence, Data Collection, Town and City Planning.**

## Introduction

Artificial Intelligence (AI) is one of the emerging technologies that is transforming urban administration and planning. Planning well is essential for resource allocation, environmental sustainability, and infrastructural development as the world's population rises. AI's real-time data analysis enables planners to manage resources, make data-driven decisions, and raise the standard of living in cities. The swift advancement of modern technology is propelling this change.

Johnson and Wang (2020) highlight the integration of AI in town and city planning, noting its ability to automate data gathering, interpretation, and forecasting. AI-based systems can evaluate trends from multiple data sources, helping planners to predict possible difficulties, optimize land use, and develop smarter cities that adapt to changing conditions, thereby decreasing time and error in traditional techniques.

With predictive models for traffic flow, environmental hazard identification, and energy consumption optimization in smart cities, AI integration in urban planning is starting to become a reality. Research indicates that artificial intelligence (AI) improves town planning procedures by

offering practical insights, tackling new urban issues more successfully than conventional techniques. Planning with AI is essential for resilient, sustainable, and efficient urban development as the world's population continues to increase (Giffinger et al., 2021).

### Statement of the problem

The rapid growth of urban populations and the complexity of modern cities have created pressing challenges for traditional town and city planning approaches, which often lack the efficiency and precision needed to address issues such as traffic congestion, pollution, housing shortages, and infrastructure demands. Emerging technologies, particularly artificial intelligence (AI), hold potential to transform urban planning by enhancing data collection and analysis. However, integrating AI into town planning faces several challenges, including limited access to high-quality, real-time data, the need for specialized skills to interpret AI-driven insights, and concerns about data privacy and ethical considerations. This study seeks to address these challenges by exploring the roles of AI in improving data accuracy, analyzing patterns, and forecasting urban needs to support more effective, sustainable, and resilient urban development.

### Objective

1. To find out the roles of artificial intelligence (AI) in analyzing data on town and city planning.
2. To examine the roles of artificial intelligence (AI) in data collection on town and city planning.
3. To investigate the roles of artificial intelligence (AI) in generating wise decision making in town and city planning.

Research questions

1. What are the roles of artificial intelligence (AI) in analyzing data on town and city planning?
2. What is the roles of artificial intelligence (AI) in data collection on town and city planning?
3. What are the roles of artificial intelligence (AI) in generating wise decision making in town and city planning?

## LITERATURE REVIEW

### Concept of Emerging Technology

According to Okonkwo and Adebayo (2021), emerging technology, which includes AI, blockchain, and IoT, is a disruptive technology that is evolving quickly and has the potential to have a big impact on economies, societies, and industries. These technologies provide new avenues for progress by challenging established practices and frameworks. They are possibly upending the status quo by quickly revolutionizing industries including healthcare, banking, and education.

Newer technologies, such artificial intelligence (AI) and machine learning algorithms are renowned for their efficiency and automation, making it possible to process massive datasets and other activities quickly and precisely. Applications for this include industrial automation, medical diagnostics, and data analysis. AI integration in healthcare enhances tailored treatment plans and diagnostic accuracy, as reported by Musa and Akinola (2020), leading to better patient outcomes. New technologies have a big impact, grow quickly, make sense, and are innovative.

Emerging technologies like IoT improve efficiency and connectivity by enabling everyday devices to communicate and exchange data, revolutionizing sectors like smart cities, agriculture, and logistics. Nwachukwu (2019) highlights that these technologies streamline supply chains, reduce waste, and optimize resources in real-time, leading to more sustainable operations. Understanding emerging technologies depends on the analyst's perspective, with some viewing them as emergent due to their novelty or extension of existing technology.

Emerging technologies like AI and blockchain pose ethical, privacy, and security challenges. They raise concerns about data ownership, surveillance, and job displacement. Despite their potential, regulatory frameworks are needed to mitigate risks and ensure their deployment benefits society(Eze

& Okafor, 2020). Emerging technology can refer to new or ongoing development in various fields, such as media, business, science, or education.

Emerging technologies represent a dynamic and evolving aspect of modern innovation with the potential to reshape industries and everyday life. Their development and application continue to influence key sectors, from healthcare to urban development. However, balancing technological advancement with ethical considerations is critical to ensuring that the benefits of these technologies are realized responsibly and equitably. Emerging technologies are new or rapidly evolving technologies that have the potential to change the way we live, work, and interact with each other.

## Concept of Artificial Intelligence (AI)

Artificial Intelligence (AI) is a technology that enables machines to perform tasks requiring human intelligence, including learning, reasoning, problem-solving, and understanding natural language. It can be categorized into narrow AI, specialized for specific tasks, and general AI, aiming to replicate human intelligence across various activities, highlighting its diverse applications in modern society.

One of the most significant advancements in AI is machine learning (ML), a subset that allows systems to learn from data and improve their performance over time without being explicitly programmed. As noted by Adeyemi and Olaniyan (2019), machine learning algorithms analyze vast amounts of data to identify patterns and make predictions. This capability has led to transformative applications in fields such as finance, where AI systems can detect fraudulent activities, and healthcare, where they can assist in diagnosing diseases based on medical imaging.

AI also plays a crucial role in enhancing decision-making processes across various industries. For instance, AI algorithms can analyze market trends and consumer behavior to provide actionable insights for businesses. According to Oladipo et al. (2021), organizations that integrate AI into their decision-making frameworks often experience increased efficiency and competitiveness. This has led many companies to adopt AI-driven solutions to streamline operations and improve customer experiences.

Artificial intelligence represents a significant technological evolution with the potential to reshape industries and society. While AI offers numerous benefits in efficiency and problem-solving, it is crucial to address the ethical implications associated with its deployment. Continued research, regulation, and public engagement will be essential in harnessing the power of AI for positive societal impact.

## Concept of Effective Town Planning

Effective town planning, also known as urban planning refers to the organized development and management of land use in urban environments. It aims to create sustainable, functional, and aesthetically pleasing communities that meet the needs of residents while balancing economic growth and environmental stewardship. According to Nduka et al. (2021), effective town planning involves a comprehensive approach that integrates social, economic, and environmental considerations into the planning process to enhance the quality of life for all residents.

Effective town planning involves strategic land allocation for residential, commercial, industrial, and recreational uses. This approach minimizes conflicts, reduces transportation costs, and promotes efficient service delivery. It leads to well-organized urban spaces, improved accessibility, and enhanced community interactions. Proper land use planning also ensures equitable distribution of green spaces and public amenities.

Participatory planning methods, as highlighted by Kahn and Rivas (2019), are crucial for successful town planning. They involve local residents and stakeholders, fostering ownership and addressing community needs. These methods integrate diverse perspectives, leading to more effective and accepted outcomes. By involving the community, planners can develop culturally relevant and supportive initiatives.

Sustainable town planning is crucial in urban areas facing population growth and climate change. Strategies like public transportation, energy efficiency, and natural habitat preservation reduce environmental impacts. Incorporating sustainable practices can create resilient cities that adapt to changing conditions while maintaining residents' well-being (Owolabi & Akinsola, 2020).

Effective town planning is vital for creating livable and sustainable urban environments. By integrating land use planning, community participation, and sustainability principles, planners can address the challenges of urbanization while enhancing the quality of life for all residents. Continued research and innovative approaches are essential to developing effective town planning strategies that respond to the dynamic needs of urban communities.

## Types of Emerging Technology in Town Planning

Emerging technologies are revolutionizing town planning by enabling efficient, data-driven, and sustainable solutions to urbanization challenges like population growth, environmental concerns, infrastructure development, and service delivery.

- Geographic Information Systems (GIS)

GIS allows urban planners to capture, analyze, and visualize spatial data. It helps in mapping, land use planning, environmental conservation, and infrastructure management. GIS provides layered data that can show everything from zoning to flood risks.

- Building Information Modeling (BIM)

BIM is a digital representation of buildings and infrastructure that facilitates better collaboration and planning. It allows urban planners to visualize, simulate, and manage urban development projects, ensuring more efficient construction processes and integration of various city elements (Eastman, Teicholz Sacks & Liston 2018).

- Drones (Unmanned Aerial Vehicles - UAVs)

Drones are increasingly used to collect data for town planning, especially in surveying large areas or difficult terrains. They offer aerial views, topographic information, and 3D mapping that help in land assessment and project monitoring (Nogueira, Oliveira, & Ferreira 2020).

- Artificial Intelligence (AI)

AI is used to analyze large datasets for decision-making in town planning. Machine learning algorithms help forecast traffic patterns, population growth, and environmental impacts, optimizing resource allocation and urban designs for future needs.

- Smart Sensors and IoT (Internet of Things)

IoT devices and smart sensors are deployed throughout cities to collect real-time data on everything from traffic congestion to air quality. This data helps urban planners make informed decisions and adapt cities for smart city initiatives, improving livability and sustainability (Gubbi, Buyya Marusic & Palaniswami 2018).

- Virtual Reality (VR) and Augmented Reality (AR)

VR and AR are used in urban planning to create immersive simulations of urban environments. Planners, stakeholders, and residents can experience virtual cityscapes and assess proposed designs in real time, allowing better feedback and collaboration.

- 3D Printing

3D printing is emerging in the construction industry, offering rapid prototyping of urban development projects. Urban planners can use 3D models to visualize and refine their plans for buildings, roads, and other infrastructure before actual construction begins.

- Renewable Energy Technologies

The integration of solar panels, wind turbines, and other renewable energy solutions into town planning helps create sustainable urban environments. Town planners are increasingly focused on energy-efficient buildings and green infrastructure to combat climate change.

- Big Data Analytics

Big data plays a crucial role in urban planning by providing insights into demographics, traffic, economic trends, and social behaviors. Planners can use big data analytics to predict future urban trends and plan cities that meet the changing needs of residents.

- 5G Technology

5G networks enable faster communication and data transfer between devices in smart cities. Town planners can leverage 5G to create more connected urban environments with enhanced services like smart lighting, traffic management, and real-time monitoring.

## The Roles of Artificial Intelligence (AI) in Analyzing Data on Town and City Planning

Artificial Intelligence (AI) has emerged as a critical tool in town and city planning, facilitating data analysis, predictive modeling, and decision-making processes. The integration of AI technologies into urban planning helps address the complexities associated with managing large populations, infrastructure, and environmental sustainability.

- Predictive Analysis for Urban Growth

AI's predictive ability in urban planning involves analyzing data like population growth, economic activities, and housing demands. This helps planners make informed decisions about land use and infrastructure expansion, enabling effective strategies to mitigate environmental impacts and mitigate urban sprawl, as noted by Zhang et al. (2019).

- Real-Time Data Processing

AI improves real-time data processing for smart city planning, utilizing IoT devices to process vast amounts of traffic, energy consumption, and public services. Chen et al. (2020) show AI optimizes traffic flow, reduces congestion, and enhances quality of life and economic efficiency in urban areas.

- Improving Infrastructure Planning

AI's ability to process large datasets improves infrastructure planning, particularly in transportation networks and utilities. By analyzing historical and current data on traffic patterns, AI systems can help cities develop smarter public transit systems. AI models are used to optimize public transportation routes, reducing operational costs and enhancing efficiency.

- AI in Risk Management and Disaster Planning

AI contributes to risk management by predicting natural disasters and their potential impacts on urban infrastructure. AI algorithms can analyze weather patterns, seismic activity, and flood risks to forecast disasters, allowing cities to build resilient infrastructures. However, AI systems have been used to predict flood zones, enabling better flood management plans in coastal cities.

- Enhanced Decision-Making through AI

AI assists urban planners by synthesizing large volumes of data into actionable insights. Using decision-support systems, AI helps urban planners make more accurate and faster decisions. According to research, AI has transformed decision-making processes by integrating geospatial data, economic trends, and social factors into planning models.

## The Roles of Artificial Intelligence (AI) in Data Collection on Town and City Planning

1. Traffic Sensors

Artificial Intelligence (AI) plays an increasingly vital role in the data collection and analysis of traffic sensors. As urban populations grow and the demand for smarter transportation systems rises, traffic management has become an essential focus for city planners and governments worldwide.

- Enhanced Data Accuracy and Real-Time Monitoring

AI, specifically computer vision and machine learning models, is improving data accuracy in traffic sensors, enabling them to process images from cameras and LiDAR, detect vehicle counts, classify types, and measure speed, even in low-visibility conditions.

- Predictive Analytics for Traffic Flow Optimization

AI-powered traffic management systems use data from traffic sensors to anticipate traffic patterns and mitigate congestion. Machine learning algorithms analyze this data, predicting peak hours, adjusting signals, and suggesting alternative routes, thereby reducing delays and improving traffic flow.

- Traffic Incident Detection and Management

AI-powered traffic sensors enable real-time detection of traffic incidents, such as accidents or breakdowns. They analyze data patterns from traffic camera feeds, reducing response times and preventing secondary accidents. AI's ability to process vast sensor data also allows traffic managers to deploy resources more efficiently, resulting in a 30% reduction in response times (Zhang et al., 2021).

- Adaptive Traffic Signal Control

AI-powered adaptive traffic signal systems are revolutionizing traffic management by dynamically adjusting signal timings based on real-time traffic conditions. By analyzing real-time data like vehicle counts and traffic density, these systems optimize traffic signal operations, minimizing delays and improving efficiency.

2. Weather Station

Artificial Intelligence (AI) has revolutionized meteorology and climatology by improving data collection and analysis capabilities in traditional weather stations. AI technologies now provide more accurate, real-time, and predictive weather data, replacing traditional sensors.

- Enhancing Data Accuracy and Quality Control

AI plays a crucial role in weather station data collection by improving the accuracy and quality of sensor data. Machine learning models help identify and correct anomalies in data. AI-driven quality control systems detect sensor errors, missing data, or outliers, learning from historical weather patterns. Once flagged, AI systems adjust readings or alert operators to investigate and calibrate the sensors (Kotsiantis, 2020).

- Predictive Weather Forecasting

AI, particularly machine learning, is a valuable tool for predictive weather forecasting due to its ability to process vast amounts of historical and real-time data. Traditional models, which rely on physics-based equations, can be computationally intensive and may not capture all aspects of complex weather systems. A study by Rasp and Lerch (2018) showed AI models outperformed numerical models in short-term forecasting.

- Climate Trend Analysis and Long-Term Monitoring

AI plays a crucial role in short-term weather forecasting and long-term climate trend analysis, enabling accurate analysis of large datasets and identifying subtle patterns. Machine learning algorithms process historical climate data, aiding in understanding climate change impacts and developing mitigation strategies.

3. Public Transportation System

Artificial Intelligence (AI) is transforming the way public transportation systems operate by revolutionizing data collection and analysis. Traditional methods of collecting transportation data, such as manual counts or surveys, are being replaced by AI-driven systems that provide real-time, accurate, and actionable insights.

- Real-Time Data Collection from Multiple Sources

AI has improved public transportation systems by collecting real-time data from various sources, including buses, trains, and passenger terminals. Sensors, GPS devices, cameras, and IoT devices are integrated into vehicles, generating data that is processed by AI algorithms to track vehicle locations, passenger loads, traffic conditions, and incidents like accidents or delays. This data optimizes routes and ensures timely service.

- Passenger Flow and Demand Prediction

AI plays a crucial role in public transportation by accurately predicting passenger flow and demand. Traditional methods rely on historical data, but AI algorithms, particularly machine learning models, can recognize patterns in real-time inputs like weather conditions and events, allowing for more accurate forecasting at specific times and locations.

- Incident Detection and Response

AI systems in public transportation can detect and respond to incidents like vehicle breakdowns, accidents, or traffic congestion in real-time. These systems use continuous data from cameras, sensors, and monitoring devices to analyze anomalies. Once detected, AI systems alert authorities, dispatch emergency services, and reroute vehicles to minimize disruptions. A study by Tseng (2020) found that AI-based incident detection systems reduced response times by 30%, improving passenger safety and service reliability.

## The Roles of Artificial Intelligence (AI) in Generating Wise Decision Making in Town and City Planning

AI is revolutionizing urban planning by providing innovative solutions to complex challenges like population growth, resource allocation, sustainability, and infrastructure management. It enhances decision-making and helps urban planners tackle these complex issues in a rapidly urbanizing world.

- Data-Driven Insights

Zhang et al. (2020) study highlights the use of AI in urban planning, enabling planners to analyze vast data from various sources like social media, satellite imagery, and IoT devices. This data-driven approach optimizes transportation systems, reduces congestion, and improves accessibility, ultimately enhancing urban mobility and quality of life.

- Predictive Analytics for Urban Development

AI-powered predictive analytics aid urban planners in predicting future scenarios and evaluating the impacts of planning alternatives. This tool, based on demographic changes, environmental conditions, and economic trends, simulates the outcomes of proposed developments, enhancing planners' ability to make strategic decisions that align with long-term urban goals, as highlighted by Kahn et al. (2021).

- Enhanced Public Participation

AI enhances public participation in urban planning by enabling collaboration between planners and community members. Platforms like AI chatbots and sentiment analysis tools allow citizens to provide feedback on proposed developments, ensuring that urban development aligns with local residents' aspirations.

- Smart Resource Management

AI plays a crucial role in optimizing resource management within urban environments. By analyzing data related to energy consumption, waste management, and water usage, AI can identify inefficiencies and recommend solutions for more sustainable practices. Research by Yang et al. (2019) illustrates how AI applications in smart cities have led to significant reductions in energy waste and improved resource allocation. The study underscores the importance of using AI to inform decision-making related to urban sustainability and resilience.

- Risk Assessment and Mitigation

Urban planning often involves navigating various risks, including natural disasters, climate change, and socio-economic challenges. AI can assist in assessing these risks and developing mitigation strategies. AI-driven risk assessment tools have been used to analyze vulnerabilities in urban infrastructure, enabling planners to prioritize investments in resilience-building measures. This proactive approach ensures that cities are better prepared to withstand future challenges.

## Methodology

In carrying out the study, a descriptive survey design was adopted and the study was carried out in two states in Nigeria, (Akwa Ibom State and Anambra State). The targeted population for the study comprised all environmental scientists and computer scientist in Nigeria. A stratified random sampling technique was used to select 25 environmental scientists and 15 computer scientist each from both State and Abia States and that gave a total of 80 respondents used for the study. The instrument used for data collection was a structured questionnaire titled "Artificial Intelligence and Emerging Technology for Service And Production Questionnaire (AIETSPQ)". Face and content validation of the instrument was carried out by an expert in test, measurement, and evaluation in order to ensure that the instrument has the accuracy, appropriateness, and completeness for the study under consideration. The reliability coefficient obtained was 0.91, and this was high enough to justify the use of the instrument. The researcher subjected the data generated for this study to appropriate statistical technique such descriptive statistics to answer research questions.

## RESULTS AND DISCUSSIONS

### Research Question 1

The research question sought to find out the roles of artificial intelligence (AI) in analyzing data on town and city planning. To answer the research percentage analysis was performed on the data, (see table 1).

Table 1: Percentage analysis of the roles of artificial intelligence (AI) in analyzing data on town and

city planning.

| ROLES | FREQUENCY | PERCENTAGE |
|---|---|---|
| Predictive Analysis for Urban Growth | 47 | 19.26 |
| Real-Time Data Processing | 56 | 22.95 |
| Improving Infrastructure Planning | 63 | 25.82** |
| AI in Risk Management and Disaster Planning | 44 | 18.03 |
| Enhanced Decision-Making through AI | 34 | 13.93* |
| TOTAL | 244 | 100% |

** The highest percentage frequency
* The least percentage frequency
SOURCE: Field survey

The above table 1 presents the percentage analysis of the roles of artificial intelligence (AI) in analyzing data on town and city planning. From the result of the data analysis, it was observed that "Improving Infrastructure Planning" 63(25.82) was rated the highest role of artificial intelligence (AI) in analyzing data on town and city planning, while "Enhanced Decision-Making through AI" 34(13.93) was rated the least. The result therefore is in agreement with the research findings of Zhang (2019) who mentioned that AI's ability to process large datasets improves infrastructure planning, particularly in transportation networks and utilities. By analyzing historical and current data on traffic patterns, AI systems can help cities develop smarter public transit systems.

Research Question 2

The research question sought to find out the roles of artificial intelligence (AI) in data collection on town and city planning. To answer the research percentage analysis was performed on the data, (see table 2).

Table 2: Percentage analysis of the roles of artificial intelligence (AI) in data collection on town and city planning.

| ROLES | FREQUENCY | PERCENTAGE |
|---|---|---|
| Traffic Sensors aided Enhanced Data Accuracy and Real-Time Monitoring | 47 | 19.26 |
| Traffic Sensors aided Predictive Analytics for Traffic Flow Optimization | 56 | 22.95** |
| Traffic Sensors aided Traffic Incident Detection and Management | 49 | 11.89 |
| Traffic Sensors aided Adaptive Traffic Signal Control | 51 | 12.38 |
| Weather Station aided Enhancing Data Accuracy and Quality Control | 41 | 9.95 |
| Weather Station aided Predictive Weather Forecasting | 38 | 9.22 |
| Weather Station aided Climate Trend Analysis and Long-Term Monitoring | 34 | 8.25 |
| Public Transportation System aided Real-Time Data Collection from Multiple Sources | 31 | 7.52 |
| Public Transportation System aided Passenger Flow and Demand Prediction | 27 | 6.55 |
| Public Transportation System aided Incident Detection and Response | 23 | 5.58* |
| TOTAL | 412 | 100% |

** The highest percentage frequency
* The least percentage frequency
SOURCE: Field survey

The above table 2 presents the percentage analysis of the roles of artificial intelligence (AI) in data collection on town and city planning. From the result of the data analysis, "Traffic Sensors aided Predictive Analytics for Traffic Flow Optimization" 56(22.95) was rated the highest role of artificial intelligence (AI) in data collection on town and city planning, while "Public Transportation System aided Incident Detection and Response" 23(5.58) was rated the least. The result therefore is in agreement with the research findings of Kotsiantis (2020) who stated that Artificial Intelligence (AI) plays an increasingly vital role in the data collection and analysis of traffic sensors. Moreover, AI-powered traffic management systems use data from traffic sensors to anticipate traffic patterns and mitigate congestion.

Research Question 3

The research question sought to find out the roles of artificial intelligence (AI) in generating wise decision making in town and city planning. To answer the research percentage analysis was performed on the data, (see table 3).

Table 3: Percentage analysis of the roles of artificial intelligence (AI) in generating wise decision making in town and city planning.

| ROLES | FREQUENCY | PERCENTAGE |
|---|---|---|
| Data-Driven Insights | 44 | 27.84** |
| Predictive Analytics for Urban Development | 34 | 21.52 |
| Enhanced Public Participation | 31 | 19.62 |
| Smart Resource Management | 26 | 16.46 |
| Risk Assessment and Mitigation | 23 | 14.56* |
| TOTAL | 158 | 100% |

** The highest percentage frequency
* The least percentage frequency
SOURCE: Field survey

The above table 3 presents the percentage analysis of the roles of artificial intelligence (AI) in analyzing data on town and city planning. From the result of the data analysis, it was observed that "Data-Driven Insights" 44(27.84) was rated the highest role of artificial intelligence (AI) in generating wise decision making in town and city planning, while "Risk Assessment and Mitigation" 23(14.56) was rated the least. The result therefore is in agreement with the research findings of Zhang (2020) who noted that data-driven approach optimizes transportation systems, reduces congestion, and improves accessibility, ultimately enhancing urban mobility and quality of life.

## Conclusion

In conclusion, Artificial Intelligence (AI) is revolutionizing urban planning by enhancing data collection and analysis, enabling informed decisions. Its ability to process vast datasets and predict trends improves urban design, infrastructure management, and sustainability. The findings exposed that "Improving Infrastructure Planning" is the most prominent roles of artificial intelligence (AI) among other roles in analyzing data on town and city planning. The findings also revealed "Traffic Sensors aided Predictive Analytics for Traffic Flow Optimization" is the highest roles of artificial intelligence (AI) in data collection on town and city planning. Finally, it also revealed that "Data-Driven Insights" is the highest role of artificial intelligence (AI) in generating wise decision making in town and city planning As cities face challenges, AI is crucial for creating adaptable, resilient, and future-ready environments, meeting population demands effectively.

## Recommendations

1. Urban planners should integrate AI-based tools into planning processes to enhance data collection, analysis, and predictive modeling for better decision-making and optimized resource allocation.
2. Governments and city planners should prioritize investments in smart infrastructure, such as sensors and IoT devices, to gather real-time data that AI can analyze for efficient urban management.
3. Collaboration between urban planners, AI experts, and policymakers is essential to ensure that AI applications align with urban development goals and address community needs effectively.
4. AI technologies should be used ethically in town planning, with clear guidelines to protect privacy and ensure that data-driven decisions promote inclusivity and social equity.
5. Ongoing research into AI's role in urban planning should be supported, alongside training for planners to effectively use AI tools and stay updated on emerging technological trends.

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