ISA Journal of Multidisciplinary (ISAJM)

Homepage: https://isapublisher.com/isajm/
Email: office.isapublisher@gmail.com

Volume 2, Issue 5, Sept-Oct, 2025 ISSN: 3049-1851

Geospatial Mapping of Sawmills in the Wood Producing Rain Forest City, Ile-Ife, Osun State

Adefisoye Emmanuel Adetayo[1], Olubaju Ayomide Emmanuel[2], Afolabi Adeniyi Samson[3], Oladeji Peter Bolaji[4], Azeez Abubakri A.[5]

[1]Department of Surveying and Geoinformatics, Lead City University, Ibadan, Nigeria
[2]Department of Property, Planning and Surveying, Ajimobi Technical University, Ibadan, Nigeria
[3]Department of Urban and Regional Planning, Obafemi Awolowo University, Ile-Ife, Nigeria
[4]Department of Urban and Regional Planning, Lead City University, Ibadan, Nigeria
[5]Department of Surveying and Geoinformatics, Lead City University, Ibadan, Nigeria

Received: 08.08.2025 | **Accepted:** 02.09.2025 | **Published:** 06.09.2025

***Corresponding Author:** *Adefisoye Emmanuel Adetayo*

DOI: *10.5281/zenodo.17073656*

Abstract **Original Research Articles**

A sawmill is one of the major forest-based industries involved in processing and maximizing the efficient use of timber, and it requires proper monitoring to ensure optimal benefits. Therefore, this study focuses on geospatial mapping of sawmills in Ile-Ife with a view to providing information that could be relevant to policy makers. The study employed attribute data and spatial data with observation of geographical coordinates of existing sawmills. Study area google earth imagery was downloaded through 'google earth pro' for secondary data. Instrument check was performed for high accuracy and quality of data was ensured. A database was developed in ArcGIS 10.7.1, where attribute data were connected to geometric data. The Geographic Information System (GIS) application was then used to generate the necessary queries for different processes within the network. Maps were then produced using ArcGIS 10.7.1 and QGIS 3.12. Ninety-eight (98) sawmills were found to exist in the study area. Seven (7) of these were inactive leaving ninety-one (91) active. Nearest Neighbour Analysis (NNA) result of the study revealed a clustered (0.78) pattern of sawmills in term of distribution across space given a z-score of -4.31. The study therefore, concluded that relevant stakeholders and policy makers in environmental management are needed to plan, coordinate and regulate proliferation of sawmill industries with modern technology for the betterment of this environment.

Keywords: *Mapping, Sawmill, Spatial distribution, Clustered Pattern, nearest neighbour analysis*.

1. INTRODUCTION

The forestry sector serves as one of the key foundations of the nation's well-being and has long been a major source of livelihood for many Nigerians (Fuwape, 2003). Nigeria's forest estate is estimated at around 10 million hectares, with about 20% designated as reserves (Olaleye, 1999). Assessments of the forest industry show that it was highly active between the 1960s and 1980s, making significant contributions to both local and international trade (RMRDC - Raw Materials Research and Development Council, 2003; Kukogho et al., 2011; Ogunwusi et al., 2013; Larinde, 2010; Ogunsanwo, 2010). Among the most valuable resources derived from forest ecosystems is wood (Igben, 2019).

In the rapidly expanding global market, the wood export industry plays a crucial role in meeting the demand for a wide range of wood products worldwide. In 2024, the total value of wood exports was estimated at approximately $152.98 billion. The global wood market itself was valued at about $6,470.15 million in 2024 and is projected to grow at a compound annual growth rate (CAGR) of 3.39%, reaching USD 7,904.05 million by 2027. Due to its excellent strength-to-weight ratio and stability, wood remains a highly suitable material for structural construction. Wood-exporting nations, therefore, make significant contributions to the global wood market and overall economic growth. The statistics on the wood exporting

countries of 2024-25 shows that China emerged as the biggest wood exporter in 2024 with wood export accounting for $16.40billion, Canada $13.54billion, Germany $10.35billion, US $9.56billion, Vietnam $6.87billion with Indonesia $3.97billion taken the least of top ten wood exporting countries in the world (TradelmeX, 2024).

The transformation of wood into physical and mechanical goods that can be utilized by humans is done by forest enterprises. Ogunsanwo (2010) classifies the industry as formal and informal. Formal sector involves structured and large-scale wood-based industries, namely, sawmills, pulp and paper mills, plywood mills, particleboard mills, and furniture factories. On the one hand, the informal sector consists of small-scale wood-based businesses that do not have formal corporate setups, such as those engaged in firewood production, charcoal production, chewing sticks, carved wood, and, in some instances, artisan cabinet making and lumber conversion. On the same note, industries have also been categorized depending on their operations and the results they desire to attain (Olawuni & Okunola, 2014a). The international standard classification of industry (2007) has identified industries all over the world that includes fishing, agriculture (hunting and forestry), mining and quarrying, construction, manufacturing (such as breweries, textiles, and iron and steel) and processing industries like sawmilling.

A sawmill, which is a processing industry, is a facility in which raw timber is converted to dimensional lumber to be sold and distributed (United States Environmental Protection Agency (US EPA), 2014). Its essence, like it was centuries ago, is to feed logs at one end and to come out with lumber at the other. Common operations of sawmills include sawing, planing, sanding, chipping, and drying wood, and most operations do some kiln drying as well. Sawmilling is thus described as the process of transforming round wood in the forests into lumber through the use of different machines, including the bandmills in breaking down logs into the desired dimensions and the re-sawing machines in transforming cants and flitches into the desired and market-ready sizes (Lucas, 1995).

Most sawmill industries in Nigeria are found in the rainforest areas, the southern parts of the country. The concentration of sawmills is the highest in Lagos, Ekiti, Osun, Cross River, Ondo, Oyo, Imo, Edo, Delta, and Ogun states, which comprise over 90 percent of the total sawmilling activities in the country (RMRDC, 2003; Bello & Mijinyawa, 2010). This shows that steady supply of logs is a major factor in determining the location of sawmills. Ajibefun & Daramola (2004) opine that the sawmilling industry, as is the case with other microenterprises, is critical in enhancing the economic development of Nigeria. It offers jobs to a great percentage of the rural people in clerical and technical jobs that include power saw operators, saw doctors, mechanics, distribution and wholesale of wood products (Alvar, 1983). Also, it was found that the marketing of sawn wood has a high potential in supporting livelihoods as an alternative source of employment in a developing economy like Nigeria where there is a high percentage of unemployment (Ohwo & Ogoha, 2017).

Regarding performance, Aruofor (2003) reported that Nigerian sawmills have an estimated capacity of 11,684,000 m³ of logs per year, with an actual capacity utilization of about 5,422,000 m³ annually. Makkonen (2018) also worked on the performance of small scale sawmilling and concluded that this sector is a significant component of wood supply chain for the connection of raw materials and finite product. Aina et al. (2005) also observed that wood waste generated during log conversion can be carbonized to produce charcoal, which serves as a viable alternative to cooking fuels such as kerosene. They therefore recommended the establishment of policies to ensure the collection and utilization of sawmill waste in every town or city. Given its economic significance, the sawmilling sector should be recognized and given its appropriate place in national development.

Recent related studies on the spatial distribution of sawmills include Alo (2017), who investigated the spatial distribution of forest reserves and sawmills in Oyo State, Nigeria, with the aim of providing information on their locations for effective monitoring. The study revealed that forest reserves in Oyo State covered 342,461 hectares, representing 12.92% of the state's total land area. Similarly, Omoigui (2016) carried out research on the spatial distribution and environmental impacts of sawmills in Benin City, Nigeria. Aim of the study was to examine spatial location pattern of sawmills and their environmental impacts. Findings identified accessibility to customers and easy accessibility to site as the most influential factors affecting the location of sawmills. Negative effects of sawmills in the study area were dust pollution, noise pollution, vibration nuisance, smoke nuisance, odour, and the positive effects were; employment creation, wood used in construction, and cheap waste wood used in cooking. The research finally recommended that loan facilities be provided to sawmill entrepreneurs and the government should lower taxes. In a similar study, Sodiya (2021) in her study on examining the spatial distribution of forest products in North Carolina revealed that manufacturers of primary forest products are inclined to cluster around sources of raw materials. Secondary forest product manufacturers were not directly connected with the location of resources but were clustered around the markets of their finished goods, especially in the Piedmont region. The findings from these studies therefore revealed that factors such as the presence of existing secondary forest product manufacturers, large urban populations, accessibility to raw materials, stable electricity supply, higher economic opportunities, ease of site accessibility, and proximity to open forest areas (as opposed to forest reserves) significantly influence the siting of sawmills.

Consequently, different studies have been carried out in the city of Ile-Ife as regards sawmill. These included Olawuni and Okunola (2014a & b); Faremi *et al* (2014); Ijaware & Adefisoye (2024); Adefisoye *et al* (2025). The study conducted by Olawuni & Okunola (2014a) examined the consequences of sawmill activities on residents' environment at different areas within sawmills in Ile-Ife, Osun State. Considerable difference was said to have existed between residences' distance from sawmills and smoke severity. The policy implications of the socio-economic impacts of the sawmill industry, as examined by Olawuni and Okunola (2014b) in Ile-Ife, Nigeria, showed that the siting and operations of sawmills possess the potential

to address key socio-economic needs of the country, including revenue generation, job creation, and the provision of infrastructure for development. Ijaware & Adefisoye (2024) in their evaluation of ambient air quality in sawmill area of Ile-Ife, Osun state, Nigeria maintained that variation existed in the environmental air quality in various sawmill sites. They therefore called for committee on community engagement who will be orientating the residents on how to keep them saved from sawmills discharge. In Adefisoye *et al* (2025) that assessed proximity of residents' home and sawmills within Ondo road axis of Ile-Ife, it was found that majority of the total number of residential buildings (almost 55%) in the study area were in close proximity to existing sawmills which is undoubtedly inimical to the residents' health and quality of environment. Having this great percentage of residential buildings within sawmill buffer means residents and sawmillers have not being developing with recourse to government regulations and this also indicated that officials of different agencies concerned have not being alive to their responsibilities. The study concluded by recommending the establishment of a new sawmill industrial estate within the city, with a properly structured buffer zone clearly communicated to the public and relevant environmental regulatory bodies. Similarly, Faremi et al. (2014) found out that the use of safety devices was not well adhered to among sawmill workers in Opa, Ile-Ife, Osun State. They have suggested that occupational health and safety interventions are urgently required and policies that would ensure monitoring and supervision of both the small- and large-scale industries on a regular basis to foster the observance of occupational health and hygiene standards. However, none of these studies investigated the active and inactive sawmills within their locations and no available published document as regards spatial distribution pattern of sawmills in the study area. Whereas, these are needed information giving series of activities that are demanded from this sector. Hence, this research is poised to explore geospatial techniques in mapping the sawmill in Ile-Ife with a view to providing information that could be relevant to policy makers. This is with specific objectives to map out the distribution of sawmills, to investigate the active and inactive sawmills and to assess spatial pattern of the distribution.

2. MATERIAL AND METHODS

2.1 The Study Area

The study area is Ile-Ife with specific attention at Ondo road area in Ife East Local Government where primary forest products industries are pronounced. Apart from this area Oluorogbo and Opa areas also housed few sawmills in the city but majorly engages in plank selling and other secondary forest products activities. Thus, Ondo road location has its peculiarities in terms of sawmill location. Ile-Ife is believed to be the natural capital of Yoruba located in the eastern part of Osun state in the southwest of Nigeria. Geographically it is situated between Latitudes 7o 13N and 7o 30N and Longitudes 4o 33E and 4o 41E. The two local government areas comprise the main city of Ile-Ife including Ife East with it's headquarter at Oke-Ogbo and Ife central located in Ajebamidele area. The fringe of the city also extends to part of Ife North and Ife South Local Governments. Its population was estimated at 509,082 and having density of 280/km^2 (Population census, 2006). It also said to cover approximately 1,791km^2. The maps of study area are as shown below.

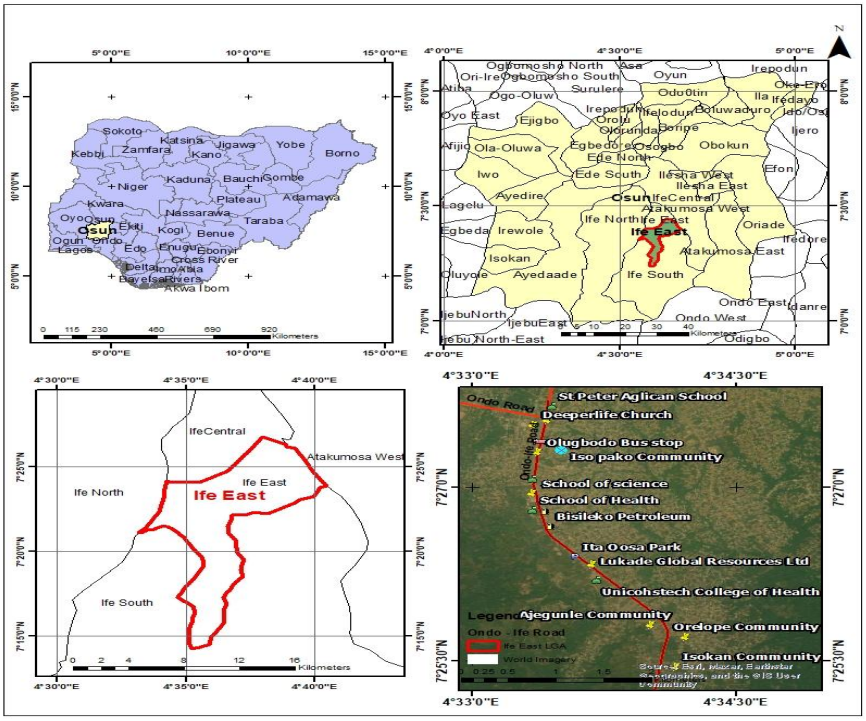

Figure 1: Study area maps showing (a) Nigeria (b) Osun State (c) Ife East Local Government (d) Study area (Ondo Road).

2.2 Data Collection

Attribute and spatial data were types of primary data collected for the purpose of this study. Attribute data involved name, location and code which were acquired through social surveys and oral interviews while spatial data focused on geographical coordinates of sawmills such as northing, easting and height. The spatial data were gotten through land surveying method of direct observation with the use of Tersus Differential Global Position System. For proper accuracy, this instrument was checked properly. Study area google earth imagery was downloaded through 'google earth pro' for secondary data. Boundary of the study area was generated from this as well through buffer as established by Ijaware & Adefisoye (2024) and Adefisoye (2024) that sawmills in this environment were located within 2km radius. Spread sheet environment using microsoft excel was used to store the acquired coordinate and saved as CSV file. The quality of data was ensured for efficiency and reliability. ArcMap environment was launched thereafter the file was imported with the location of each sawmill displayed using the Northing and Easting. The displayed event was then exported as a point shape file using the coordinate system (WGS 84 UTM ZONE 31N). ArcGIS 10.7.1 and QGIS 3.12 were employed. Processes such as geo-referencing, digitizing, importation of spread sheet data into ArcGIS, re-projection and symbology were all used to produce the sawmill distribution maps of the study area. NNA was adopted for spatial data, therefore spatial distribution pattern of the existing sawmills was investigated. Database that linked both attribute and spatial information is as shown below.

Table

Sawmills

OBJECTID *	Name	Code	N	E	h	Shape *	POINT	NAME	LOCATION
1	PT1	Inactive	824196.62066	671688.3464	281.1412	Point	1	AROWOLO	EYIOWUKAWI ESTATE
2	PT2	Active	824035.05135	671667.52899	287.1481	Point	2	ARIGBANLA	EYIOWUKAWI ESTATE
3	PT3	Inactive	823884.65618	671725.85374	290.5494	Point	3	UNKNOWN	ABE IGI AREA
4	PT4	Active	823865.65145	671856.78671	283.259	Point	4	BISI ABASS	ABE IGI
5	PT5	Inactive	823659.521	672066.25662	276.6003	Point	5	MOYASHA	OWO EYE
6	PT6	Active	823523.84553	672254.62275	267.3864	Point	6	BAMISAYE	OWO EYE
7	PT7	Active	823540.30562	672146.30915	269.8077	Point	7	IBISOMI	OWO EYE
8	PT8	Active	823486.73141	671891.89075	276.6552	Point	8	NAIRA	OWO EYE
9	PT9	Active	823323.17536	671911.33957	273.7474	Point	9	AGBE	BESIDE BOVAS SCH OF SCIENCE
10	PT10	Inactive	823240.56339	671938.23512	269.8957	Point	10	GABIKE	PLANK MARKET
11	PT11	Active	823259.58825	671965.51268	272.0148	Point	11	EMMONY	PLANK MARKET
12	PT12	Active	823335.89838	672015.32255	272.6674	Point	12	SAMMIK	PLANK MARKET
13	PT13	Active	823355.56314	672083.54877	269.9897	Point	13	MURPHY	PLANK MARKET
14	PT14	Active	823390.86346	672133.64174	267.4408	Point	14	MURPHY	PLANK MARKET
15	PT15	Active	823379.18877	672291.25078	264.7954	Point	15	ASIWAJU	PLANK MARKET
16	PT16	Active	823175.75669	672188.3196	260.1643	Point	16	IPADEOLA	PLANK MARKET
17	PT17	Active	823227.44684	672136.4322	264.408	Point	17	UNKNOWN	PLANK MARKET
18	PT18	Active	823150.58154	672146.01698	259.0197	Point	18	OPAKAN	PLANK MARKET
19	PT19	Active	823168.60237	672109.82146	261.1823	Point	19	OMOJESU	PLANK MARKET
20	PT20	Active	823190.93621	672048.81426	264.4684	Point	20	ELEPO	PLANK MARKET
21	PT21	Active	823107.88424	671956.91781	267.7447	Point	21	ANIMASAHUN	PLANK MARKET
22	PT22	Active	822887.12196	672024.35645	265.182	Point	22	GOD IS GOOD	BEFORE IFELERE JUNCTION
23	PT23	Active	822856.67392	672180.18566	267.2161	Point	23	ORISUNMBARE	IFELERE
24	PT24	Active	822841.6492	672357.26599	258.1409	Point	24	ABA OLODODO	IFELERE
25	PT25	Active	822830.39489	672380.27403	256.563	Point	25	OYI	IFELERE
26	PT26	Active	822902.96929	672372.97637	257.9352	Point	26	BABA DAMI	IFELERE
27	PT27	Active	823050.328	672640.87573	253.7604	Point	27	TRINITY	IFELERE
28	PT28	Active	822678.41167	672218.34905	259.8918	Point	28	ELEBAYO	OPP IFE OOYE LCDA
29	PT29	Active	822732.71567	672269.41969	259.0908	Point	29	ELEBAYO	OPP IFE OOYE LCDA
30	PT30	Active	822515.36862	672327.07033	253.2677	Point	30	UNKNOWN	OPP IFE OOYE LCDA
31	PT31	Active	822645.45722	672574.49474	245.832	Point	31	ONA OPE PO	TEMITOPE QUARTERS
32	PT32	Active	822685.068	672558.53763	246.1329	Point	32	ALHAJI MUFU	TEMITOPE QUARTERS
33	PT33	Active	822648.61337	672518.14615	248.1513	Point	33	ADEDOJA	TEMITOPE QUARTERS
34	PT34	Active	822627.72573	672490.61462	249.4779	Point	34	LAISI ESE	TEMITOPE QUARTERS

(0 out of 98 Selected)

Sawmills

Figure 2: Database linking attribute and spatial data

3.0 RESULTS

This section deals with presentation of results on spatial distribution of sawmills, investigation on active and inactive sawmills and distribution pattern of sawmills in the study area.

3.1 Spatial Distribution of Sawmills

The figure 3 shows the spatial distribution of existing sawmills in the study area. Ninety-eight (98) sawmills were identified which confirmed the result of a study earlier this year. Attribute and spatial information of some of these sawmills are as contained in Figure 2. Isokan community, abojupa area in

Erefe has the highest concentration of 15 sawmills (PT 84–98), next to this was Orelope area where the number of sawmills was 14 (PT 60–73), followed by Ajegunle area which also known as Alalumole with the concentration of 13 sawmills (PT 38–50) and Plank Market that had 12(PT 10-21). Pockets of low and moderate concentration were found in areas like Temitope quarters, Ifelere, Fagbamiye, Owo Eye, Opposite Transformer, MTN Junction, Abe Igi and Eyiowukawi. The least which was 1 found in opposite Trailer park (PT 35), Nathan area (PT 36) and beside BOVAS (PT 9). Therefore, considerably high concentration of sawmills was observed in the study area. According to oral discussion had with one of the old sawmillers people contributed money together to buy land and later shared among them for individual sawmill sites. Many at times, individual purchased large expanse of land which later sold to members, so that the place could be used for this purpose. Majorly this was the system the sawmillers used to get most of this large expanse of sites they are operating till today. Map showing spatial distribution of sawmills is as shown in Figure 3 below.

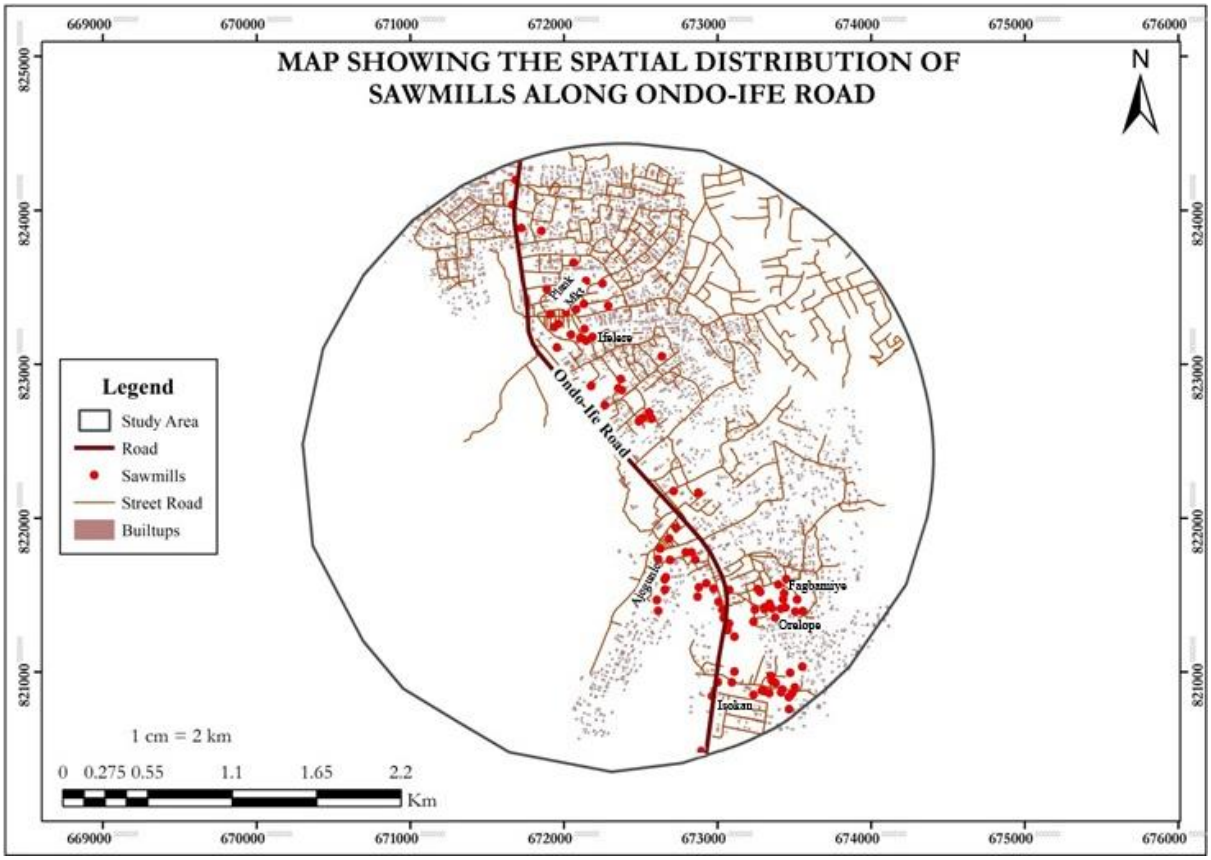

Figure 3: Map showing spatial distribution of sawmills in the study area

3.2 Spatial Distribution of Active and Inactive Sawmills

Further spatial analysis in Figure 2 & 3 shows that out of the existing 98 sawmills in the study area which were used in this analysis, seven (7) of them are currently inactive and non-operational leaving ninety-one (91) as the functional ones as at the time of observation. The inactive sawmills as shown in Figure 2 were Arowolo (PT 1), unknown name (PT 3), Moyasha (PT 5) and Gabike (PT 10) respectively located in Eyiowukawi/Olugbodo estate, Abe igi area, Owo eye and Plank market. Others included Milalog (PT 36) located at Nathan area, Taorid (PT 42) in Ajegunle area and Saro (PT 59) which was also located opposite transformer junction at Ita osa / Erefe area. At the same time, it was observed that two of these sawmill sites specifically one unknown name (PT 3) and Moyasha (PT 5) are likely to be converted to another use with what was noticed during the survey because the structures there were not being properly put together again it was like the owners will be vacating the sites. The reason for the inactiveness of these sawmills was not known due to the fact that nobody was there to give any information concerning the site during the survey. Map showing spatial distribution of active and inactive sawmills is as shown in Figure 4 below.

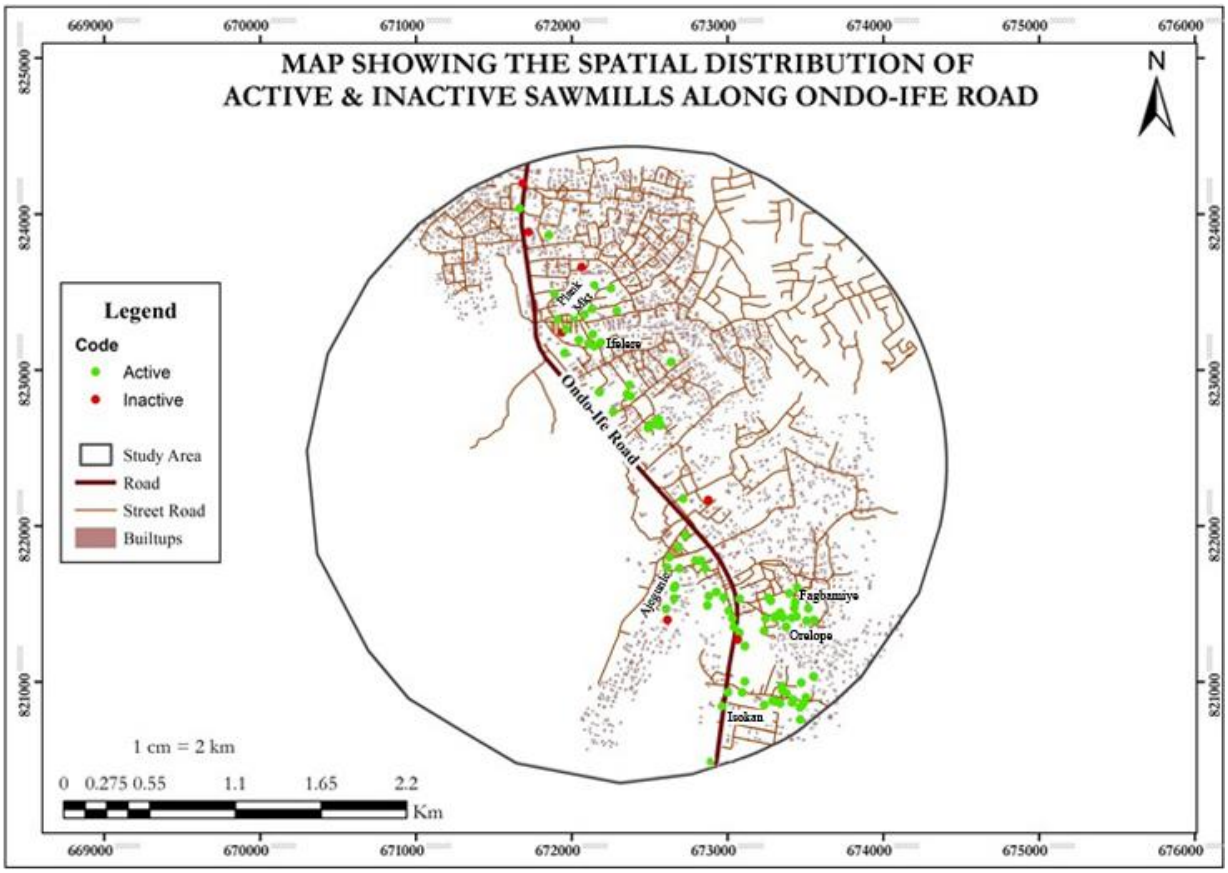

Figure 4: Map showing spatial distribution of active and inactive sawmills in the study area

3.2 Distribution Pattern of Existing Sawmills

The spatial distribution of the 98 existing sawmills was assessed using the Average Nearest Neighbor (ANN) tool to identify their locational pattern. This method (NNA) evaluates the arrangement of features by measuring the distance between one phenomenon and another in space. It not only considers the distance between points but also identifies the closest neighboring point. The results of NNA are usually presented as a ratio or index. As shown in Table 1, the Nearest Neighbor Index (NNI) value of 0.782 (less than 1) indicates a clustered distribution pattern, though leaning slightly towards randomness, since smaller values reflect stronger clustering. Additionally, the computed NNI was associated with a z-score of -4.13, as presented in Table 1.

Table 1: Summary of nearest neighbor analysis

Observed Mean Distance:	71.9072 Meters
Expected Mean Distance:	91.9598 Meters
Nearest Neighbor Ratio:	0.781941
z-score:	-4.129688
p-value:	0.00003
Distance Method:	Euclidean Distance

4.0 DISCUSSION

Geospatial mapping of sawmills in Ile-Ife, Osun state, Nigeria has been conducted. This indicated a considerably high concentration of sawmills in this environment with a total of 98 at different locations which confirmed the result of Adefisoye *et al* (2025). Considering this sector with different activities on going, government should not just close its eyes. These activities if well monitored will go a long way in terms of boosting city economy and as well serves as a veritable source of income for the government at different levels. Though, its consequences are not unnoticed in the environment. Result of the study supports the assertion of Faremi *et al*, (2014) that there are many sawmills in Ile-Ife. High concentration of sawmill

facilities in the study area is hinged on the fact that Ile-Ife is located within the heart of forest belt in the southwest, Nigeria and most especially it housed Government Forest Reserve. This supports the findings of Bello and Mijiyawa (2010), who noted that most sawmill industries in Nigeria are concentrated within the wood-producing rainforest zones, particularly across the southwestern states. Maps were generated for the study area. These maps can serves as policy guide during any intervention. Out of these 98 existing sawmills 7 were inactive leaving 91 in active state at the survey period. 2 out of these 7 might have determined to exit the business based on the sites condition, the reason which was not known. Meanwhile there are many factors determining entry and exit of industries (Carree & Thurik, 1999). The reason(s) for attempting to exit the industry and the present inactiveness of the remaining 5 was not known. This therefore brings to the mind that goal and objectives of the business as well as characteristics and conditions of the market should be first understood before venturing into it. NNI of 0.782 depicts a clustered pattern of sawmill distribution in the study area. The NNA result of the study revealed a clustered pattern of sawmill in term of distribution across space given a z-score of -4.13. This negative z-score result confirmed that the value measured is less than or below the mean in a normal distribution. Sawmills are therefore concentrated within shorter distances to each other. This result aligns with the study of Adefisoye *et al* (2025) that sawmills are closer to each other. Even, considering the observed mean and expected mean distances of sawmills in the study area with 71.90m and 91.96m respectively. It is also in consistent with Alo (2017) that determined mean distances from each sawmill in Oyo state. However, result of this study is in contrast with the study of Omoigu (2016) which NNA result indicated a dispersed (regular) pattern of sawmills in term of distribution across space given a z-score of 541.60 in Benin City. This study calls for necessary collaborations from stakeholders for proper monitoring of the study area.

4.0 CONCLUSIONS

This study has met its aim giving the significant insight into the distribution of sawmills in Ile-Ife, Osun state, Nigeria. Spatial distribution of sawmills in the study area was examined and the result showed a substantial high concentration of sawmills with 7 currently inactive. The NNA result revealed clustered pattern of distribution which indicated that sawmills are somehow in close proximity to each other. However, this result should be of great concern to government at every level considering the consequences of sawmill concentration pattern that may stems from low prioritization and weak integration of policies on this sector. Therefore, the study recommends that relevant stakeholders and policy makers in environmental management are needed to plan, coordinate and regulate proliferation of sawmill industries with modern technology for the betterment of this environment.

5.0 FUNDING

No funding was secured for this research and this served as a limitation to the area covered.

6.0 CONFLICT OF INTEREST

We declare that there is no conflict of interest during submission of this work.

7.0 ETHICAL CONSIDERATION

The consent of saw millers association in this area was sought at the beginning of the study hence, their cooperation during data acquisition.

REFERENCES

Adefisoye, E.A. (2024). Geospatial Appraisal of Sawmills' Effects on Residential Axis of Ondo Road, Ile-Ife, Osun state. A Thesis submitted to the Department of Surveying and Geoinformatics in partial fulfillment for the award of Master of Technology Degree in Surveying and Geoinformatics, Federal University of Technology, Akure, Ondo State, Nigeria.

Adefisoye, A. E., Ijaware, V.O., Olubaju, A.E., and Afolabi, A.S. (2025). Proximity Analysis of Residents' Homes and Sawmills within Ondo Road Axis of Ile-Ife, Osum State, Nigeria. African Journal on Land Policy and Geospatial Sciences. Land Policy and Regulatory Framework. Vol. 8 No. 3 (2025)

Adenuga, B. O., and Omoluabi, C.A. (1975). "Sawmilling in Nigeria!, Seminar on Sawmilling for Developing Countries, Kolka, p.36.

Aina, O.M., Adetogun, A.C., Adedokun, M.O. and Onilude, M.A. (2006). Alternative Cooking Fuels From Sawmill Wastes. *Farm Management Association of Nigeria. (FAMAN) Journal, 8 (1): 45-49*

Ajibefun, I. A., and Daramola, A.G. (2004). Determinant of Technical and Allocative Efficiency of Micro-enterprises: Firm-level evidence from Nigeria!. African Development Review, Vol. 15. Pp.353-95.

Akinbode T., and Olujimi, J.A.B. (2014). Effects of Sawmill Wastes in Residential Areas of

Ogbese and Akure townships, ondo state, Nigeria: *International Journal of Innovation and Scientific Research ISSN 2351-8014 Vol. 9 No. 2 Sep. 2014, pp. 399-409.*

Alo, A.A. (2017). Spatial Distribution of Forest Reserves and Sawmills in Oyo State, Nigeria.

Forests and Forest Products Journal 10:60-72, Forest and Forest Products Society.

Alvar, G. O. (1983). Sawmilling Industry in Nigeria, Field Document No. 17, FAO, Rome.pp 53.

Aruofor, R. O. (2000). Review and improvement of data related to wood-products in Nigeria.

EC-FAO Partnership Programme (1998-2001) Tropical forestry Budget line B7-6201/97-15/VIII/FOR PROJECT GCP/INT/679/EC.

Bello, R.S., and Mijinyawa. Y. (2010). Assessment of Injuries

in Small Scale Sawmill Industry

Of South Western Nigeria. Journal of Scientific Reserch and Development. Manuscript 1558. Vol.XII, March, 2010

Carree, M.A and Thurik, A.R (1999). The carrying capacity and entry and exit flows in retailing. *International Journal of Industrial.* JEL classification: L13; L81, 0167-7187/99/$, Elsevier science B.V. P11: S0167-7187(97)00072-6

Faremi, F.A., Ogunfowokan, A., Mbada, C.E., and Olatubi, M.I. (2014). Occupational Hazard Awareness and Safety Practices among Nigerian Sawmill Workers: *International Journal of Medical Science and Public Health, 2014, Vol. 3, Issue 10.*

Fuwape, J.A. (2003). The Impact of Forest Industries and Wood Utilization. Paper on the environment submitted to the XII world forestry congress, 2003, Quebe City, Canada.

Igben, J.L. (2019). Impact of Sawmill Industry on Maritime and Riparian Environments along Selected Rivers in Delta State, Nigeria. J. Appl.Sci.Environ.Manage. Vol. 23(3) 551-556 March 2019

Ijaware, V.O., and Adefisoye, E.A. (2024). Spatial Analysis of Ambient Air Quality in the Sawmill Environment of Ondo Road, Ile-Ife, Osun State, Nigeria. J of Pollut. Community Health. Vol. 3 Iss 1 (2024). DOI: 10.58489/2836-3590/023

International Standard Classification of Industry. (2007). Revision – 3

Kukogho, J.E.V., Aghimien, M. O., Ojo, B.A., Adams and Akinbosoye, B.S. (2011). Assessment of wood waste generated in some selected sawmills in Kajola local government area of Oyo State. *Continental Journal of Agricultural Economics 5(2): 8-11*.

Larinde, S.L. (2010). Secondary processing and the Nigeria saw mill industry. Issues, Challenges and Monograph Series (Nos 4) National Centre for Technology Management. ISBN 987-978-49820-3-0.

Lucas, E.B. (1995). Wasted Tree Products in Nigeria, (their causes, extent and characteristics). *Nigerian Journal of Forestry*, 5(1 & 2): 24-30.

Makkonen, M. (2018). Stakeholder Perspectives on the business potential of digitalization in the wood products industry. Bioprod.Bus

Ogunsanwo, O.Y. (2010). Challenges of wood utilization in Nigeria. In S. Kolade Adeyoju and S.O. Bada (eds) Reading in sustainable tropical forest management. Pp 293-303.

Ogunwusi, A.A., Jolaoso, M.A., Onwualu, A.P., and Onilude, M.A. (2013). The challenges of optimizing use of wood in tackling climate change in Nigeria. *Journal of Sciences Research 3(5): 106-115*

Olawuni, P.O., and Okunola, O.H. (2014a). Socio-economic Impacts of Sawmill Industry on

Residents. A Case Study of Ile-Ife, Nigeria. *Journal of Economics and Development Studies 2014, Vol. 2, No. 3, pp. 167-176.* ISSN: 2334-2382

Olawuni, P.O., and Okunola, O.H. (2014b). *An A*ssessment of the Environmental Effects of

Sawmilling Activities on Residents of Ile-Ife, Nigeria. *Journal for Environmental Design and Management Vol.6 no. 1 - 2*

Olaleye, O.O. (1999). Potentials for the Development of Private Forest Plantations in Nigeria.

An invited paper delivered at a 2-day workshop on "Value-added wood and wood products for export" organized by the African Network for Wood Research and Development (ANWORD), Held at the Conference Centre, University of Ibadan, Ibadan, Nigeria. Feb. 10-12, 1999

Ohwo, O. A., & Ogoha, E. (2017). Contributions of Sawn Wood Trade to Livelihood

Sustenance in Sapele Local Government Area of Delta State, Nigeria: *Journal of Agriculture and Food Environment Vol. 4(1): 37-46, 2017 www.jafedelsu.com*

Omoigui, M. (2016). The spatial distribution and environmental impact of sawmills in Benin

City. University of Benin, Benin City, Nigeria.SSC1205596. https://www.iwemi.com

Population Census. (2006). Federal Republic of Nigeria Official Gazette, Abuja 2nd February, 2009 No. 2 Vol.96, Federal Government Printer FGP 16/22009/10,000 (OL 02)

Ramasamy, G., Ratnasingam, J., Bakar, E.S., Halis, R., and Muttiah, N. (2015). Assessment of Environmental Emmissions from Sawmilling Activity in Malaysia. BioRes. 10(4), 6643-6662

Raw Materials Research and Development Council. (2003). Multi-disciplinary committee report of a technoeconomic survey on Wood and Wood Products Sector (4th update) December 2003. *Pub. Raw Materials Research and Development Council*. (Pp.91-120)

Sodiya, O.E. (2021). Sptial Analysis of the Forest Products Industry in North Carolina. A thesis submitted to the Graduate Faculty of North Carolina State University in partial fulfillment of the requirements for the degree of Master of Science. Forestry and Environmental Resources, Raleigh, North Carolina. https://repository.lib.ncsu.edu

TradelmeX (2024). Top 10 W00d Exporting Countries of 2024-25. April 10, 2024

United State Environmental Protection Agency, (2024). General Permit for New or Modified Minor Sources of Air Pollution in India Country.