



A Spatio-Environmental Appraisal of Auto Mechanic Activities in Sabon Gari Local Government Area, Kaduna, Nigeria

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ABSTRACT

The paper examined the spatio – environmental characteristics of the auto mechanic service industry in Sabon Gari Local Government Area (L.G.A) in Zaria, Kaduna State. It adopted a field survey approach and examined the phenomenon in 11 wards in the 2 districts of Sabon Gari L.G.A in Zaria, Kaduna State. A sample size of 88 auto mechanic workshops were selected using a stratified sampling approach, while systematic random sampling was used to select one out of every three workshops in the study area. The data collected was analyzed using simple descriptive statistics. Some of the findings revealed that participants chose to locate by the roadside for higher patronage. Also, apart from revenue generation, there are no urban management strategies to guide the development of auto mechanic activities in the area, and there is a high level of ignorance about the negative environmental effects of waste generated from the activities. The paper therefore recommended integrating auto mechanic activities into the urban land use structure, and suggested that adopting environmentally friendly space assessment and allocation practice for this industrial sub-sector is necessary, along with the provision of incentives for auto mechanics to enable them embrace formally designated auto mechanic sites.

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Introduction

The automobile mechanic service industry is one of the most important industries in both the formal and informal sectors. It affects not only the economy in relation to job creation, source of revenue to government and rendering of essential services to the populace but their activities also impacts on the physical environment as well as urban form. One of the major sources of increase in heavy metal concentration of the ecosystems in Nigeria is auto mechanic activities [1]. These auto mechanic workshops are found in clusters of open plots of land in the vicinity of urban towns and cities [2, 3]. Their locations are not officially designed for repairs and servicing of motor vehicles or auto use. They occupy land for other purposes such as road reservations or right-of-ways, residential, agricultural, and recreational uses, among others. This is contrary to what is obtainable in a planned society where auto mechanic workshops are located or concentrated in specific designated spaces [4]. Within the clusters are people who specialize in electrical aspects of auto repairs, repairs of brakes and steering, automatic or standard transmission engine, vulcanizing, spray painting, recharging of auto batteries, welding and soldering, and panel beating. Each of these activities generates various types of waste (gasoline, diesel, spent engine oil and paint) which are disposed of by simply dumping in nearby bushes or surrounding areas which pose risks for human health and the environment [5]. Governments in their quest for healthy and aesthetically appealing

urban environment have responded to this problem by forcefully relocating such activities within the urban area to the urban fringes because their activities constituted a threat to the aesthetics of the urban environment [6]. This solution is ad hoc and without planning input. Therefore, there is need for physical planning input in addressing the increasing problem of reduction in environmental quality and distortion of the urban form caused by auto mechanic service industry in our urban environment. Most of the automobile mechanic workshops in the study location, Sabon Gari Local Government Area (L.G.A) are located indiscriminately. They occupy land for other purpose such as residential, agricultural, recreational and open spaces [6]. The waste generated by auto mechanic activities in these areas especially within the residential areas such as gasoline (petrol), diesel, spent engine oil and paint are potential threats. These categories of waste are generated by individuals who may not know the potential human risk of exposure to such pollutants. They dump them with no further treatment, thereby causing environmental degradation.

This study was narrowed to focus on appraising the spatio-environmental dimensions of auto mechanic activities and how they have altered the urban form of the study area which comprises two districts (Samaru and Sabon Gari) and eleven wards (Samaru, Bomo, Basawa, Jama'a, Hanwa, Dogarawa, Zabi, Chikaji, Muchia, Jushi and Unguwar Gabas). This was achieved by examining the existing locations as well as the spatio-environmental characteristics

of the auto mechanic service industry in Sabon Gari L.G.A, identifying the problems and prospects of the sector in the study area, and finally making recommendations for auto mechanic activities in the study area.

Literature Review

Nigeria is the most populous country in Africa, and by implication, this increases the number of vehicles that are used for commercial and private purposes. Over the years, there has been an increased number of car owners with a resultant increase in motor mechanic workshops across the country. A number of studies have examined activities of the auto mechanic industry in Nigeria. Such studies include [2, 3, 5, 6, 8-12].

Spatially, for example in Benue State, it was reported that auto-mechanic workshops are scattered all over the city [7]. In a similar study, Ojibo [6] also reiterated that most of the automobile mechanic workshops in Kaduna Metropolis are located indiscriminately in places not officially designated for repairs and servicing of motor vehicle or auto use. These auto mechanic workshops are found in clusters of open plots of land in the vicinity of urban towns and cities [2, 3].

Environmentally, one of the major sources of increase in heavy metal concentration of the ecosystems in Nigeria is auto mechanic activities which generate wastes by individuals who may not know the potential human risk of exposure to such pollutants and therefore dump such wastes without further treatment thereby causing environmental degradation [1].

Unfortunately, effects of auto mechanic activities in Nigeria have received limited attention even though these activities have been shown to produce harmful wastes. Therefore, there is need to continually monitor their nature, volume, direct harmful effects and current methods of disposal as well as potential impacts on the environment [9]. The heavy metals most frequently encountered in this waste include copper, lead, nickel, chromium, cadmium, zinc, manganese and nickel, all of which pose risks to human health and the environment.

In trying to address this problem, the common practice by the government in Nigerian cities and towns is to allocate large portions of land, sometimes reaching 5 hectares or more, to groups of small-scale auto-mechanic businesses and designate these as 'mechanic villages' where they locate their workshops and repair yards to offer their services to the public. It is presumed that there are environmental threats associated with this practice. The larger the city, the larger the number of such mechanic villages contained in it. A typical city usually has one to three mechanic villages, in proportion to its population and activities; but some cities have more. It is also noteworthy that there are urban centres that have no mechanic villages in Nigeria. A number of studies conducted on

auto mechanic villages have been reported for some small and medium-size cities in the country, namely: Iwo [13], Port Harcourt [14], Akure [15]), and locations in the Imo river basin [2].

Mechanic village concept has been described as a twenty-first century strategy to improve urban environmental quality in developing countries [3]. The advantages of mechanic village over a city wide spread of mechanic workshops were originally conceived to be geared towards saving automobile owners the trouble of searching for mechanic specialists, preventing motorists from falling into the hands of incompetent mechanics, and creating opportunities for knowledge sharing among mechanics. They also serve as large-scale skill acquisition centres for auto mechanics, auto-electricians, spray-painters, panel beaters and welders, spare parts fabricating and machine operators, spare parts dealers (old and new), particularly since the late 1980's when the import of used cars from Western Europe and the USA increased dramatically.

The mechanic villages also improve urban aesthetics by removing a large number of degraded makeshift workshops scattered all over the urban landscape. In addition, they provide accommodation for some of the trainees, space for spare parts shops, and restaurants, as well as yards for junk cars and unserviceable vehicles that would have otherwise constituted environmental nuisance in homes and public places. Despite the numerous advantages, mechanic villages' projects may not have been provided with sufficient funding or significant attention by the government proprietors, resulting in their poor infrastructural development. This is supported by Nwachukwu *et al.* [16], Udebuani *et al.* [9], and Iwegbue [14], who reported that these mechanic villages are poorly developed with no waste management plans. They described the soils as having severe to excessive heavy metal pollution, causing ecological and public health hazards. Nwachukwu *et al.* [16] found that there is no enforcement of any rule guiding automobile workshops and mechanic practice in the villages; thus, the need for mechanic villages to be environmentally friendly.

Methodology

The survey covered the auto mechanic industry with respect to their locational preferences, operational practices and access to space. A field survey approach was adopted for the study. Data was obtained through field survey observations, interviews using semi-structured questionnaires, and oral interviews. The population of auto mechanics in the study area was 267. Stratified random sampling was used to select workshops in each of the five specialization groups of the auto mechanic service industry (auto mechanics, motorcycles, automated tricycles, trucks and vulcanizers). Stratified sampling was used to select 88 auto mechanic locations (representing one-third of the total population) auto mechanic locations within the 11 wards in the study area.

Systematic random sampling was then used to select one out of every three auto mechanic workshops. Simple descriptive statistics

was used to analyze the collected data. The locations of the mechanic workshops within the study area are shown in Figure 1.

Table 1: Categories of Selected Auto Mechanic Workshops in Sabon Gari L.G.A.

| Type of service | No. of Respondents | Percentage (%) |
|----------------------------|--------------------|----------------|
| Car repairs | 32 | 36.3 |
| Motor cycle repairs | 31 | 35.2 |
| Vulcanizing | 22 | 25.0 |
| Trucks repairs | 2 | 2.3 |
| Automated tricycle repairs | 1 | 1.2 |
| Total | 88 | 100.0 |

Source: Field Survey, 2019

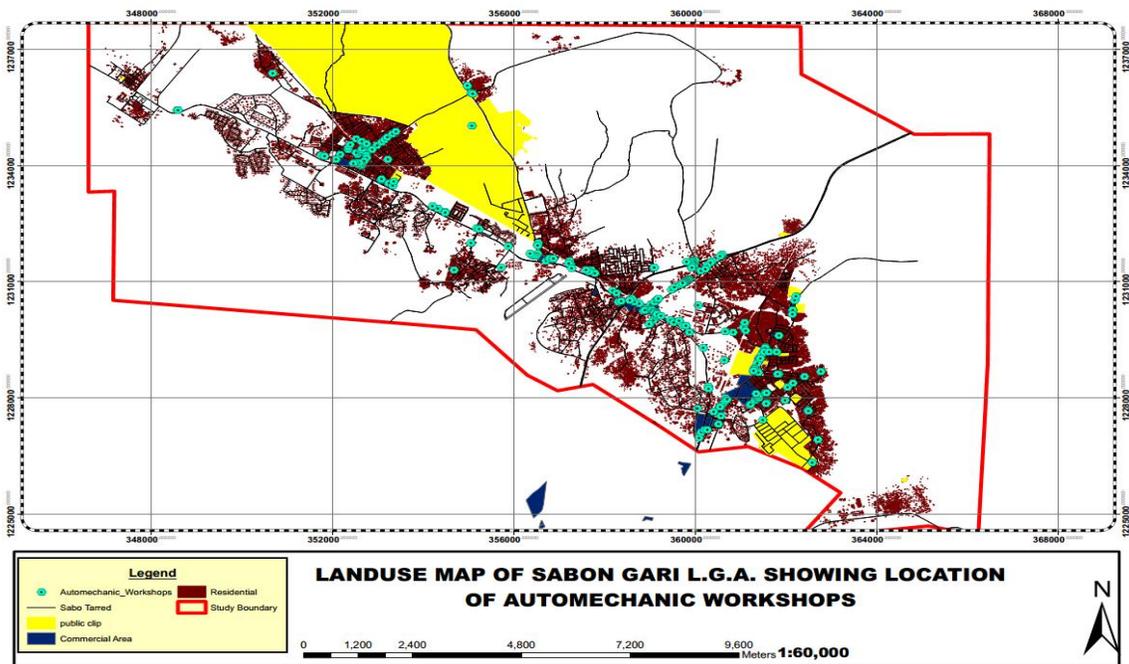


Fig. 1: Landuse Map of Sabon Gari L.G.A. Showing Location of Auto-Mechanic Workshops [17].

Results and Discussion

This section highlights the findings of the study and shows the spatio-environmental characteristics of auto-mechanic activities in the study area.

Location of Auto-Mechanic Activities

Table 2 shows that a majority of the mechanic workshops (88.64%) are located by the roadside. This is in agreement with findings of [7] who observed that auto-mechanic workshops are scattered all over Nigerian cities, which according to Chukwura *et al.* [12] has led to wide spread soil contamination.

Table 2: Location of Workshop

| Location of Workshop | Number | Percentage (%) |
|--------------------------|-----------|----------------|
| By the roadside | 78 | 88.64 |
| Within residential areas | 6 | 6.81 |
| Within commercial areas | 4 | 4.55 |
| Total | 88 | 100 |

Source: Field survey, 2019

Area Coverage of Auto-Mechanic Activities

The spatial coverage of auto mechanic service industry in the study area is 66,263.09 m² (6.63 ha). This makes it 0.41% of the total land area of the study area, which is 1631.17 ha. Details are shown in Table 3.

Table 3: Land Area Coverage by Mechanic Activities

| Range of Land Coverage (m ²) | Number | Percentage (%) |
|------------------------------------------|------------|----------------|
| Less than 500m ² | 204 | 76.40 |
| Between 500-1000m ² | 17 | 6.37 |
| 1000m ² & above | 46 | 17.23 |
| Total | 267 | 100 |

Source: Field Survey, 2019

Waste Generation Typology and Awareness of Effects

Table 4 shows that the waste generated by a majority of mechanics is metal scraps (39.77%) and used oil (36.37%). This is a potential source of income as metal scraps and spent oil can be recycled and reused which will be economically beneficial to both the mechanics and the local government. However, these wastes are indiscriminately being thrown into the surroundings, an action which causes spatio-environmental pollution as reported by other researchers [1-3]. The study also found that 25% openly dumped their waste while 61.4% sold their waste to scavengers. The operators are also largely unaware of the effects of these waste materials on the environment.

Table 4: Major Waste Generated from Activities

| Waste | No. of Respondents | Percentage (%) |
|---------------------|--------------------|----------------|
| Metal scraps | 35 | 39.77 |
| Rubber and plastics | 7 | 7.95 |
| Chemical substances | 14 | 15.91 |
| Used oil | 32 | 36.37 |
| Total | 88 | 100 |

Source: Field Survey, 2019

Disposition towards Relocation

The majority of the auto mechanics (68%) are willing to be relocated to a mechanic village as reflected in Table 5. From the results of this findings, it is clear that the mechanics are eager to embrace the idea of mechanic village.

Table 5: Willingness to Relocate to a Mechanic Village

| Response | No. of Respondents | Percentage (%) |
|--------------|--------------------|----------------|
| Yes | 60 | 68 |
| No | 28 | 32 |
| Total | 88 | 100 |

Source: Field Survey, 2019

Table 6 shows that a majority (33.33%) of respondents would welcome the idea of relocation due to prospects of security of tenure. This suggests that at present, legal access to land is difficult for the practitioners in the industry as they are continuously being ejected at will from their locations by land owners.

Table 6: Reasons for Willingness to Relocate

| Reason | No. of Respondents | Percentage (%) |
|----------------------------------------|--------------------|----------------|
| Opportunity for self-improvement | 14 | 23.3 |
| Security of tenure | 20 | 33.3 |
| Access to modern tools and equipment | 5 | 8.3 |
| Improved working environment | 9 | 15.0 |
| Increased knowledge | 6 | 10.0 |
| Automation will reduce physical labour | 10 | 6.0 |
| Total | 60 | 100.0 |

Source: Field Survey, 2019

Table 7: Reasons for Unwillingness to Relocate

| Response | No. of respondents | Percentage (%) |
|------------------------------------|--------------------|----------------|
| Established patronage | 8 | 28.5 |
| Adjustment to location environment | 5 | 17.8 |
| Closeness to residence | 4 | 14.2 |
| Security | 4 | 14.2 |
| Undue competition | 3 | 10.7 |
| Total | 28 | 100.0 |

Source: Field Survey, 2019



Table 7 shows that a majority of the mechanics who are against relocation (28.57%) by the government consider patronage as being more important than security. This means that despite the inconveniences experienced in their present locations, some mechanics would rather stay where they are than move to a new location.

The areas of specialization in the auto mechanic industry in the study area are auto mobiles repairs (including panel beating, painting, and electric works), motorcycle repairs, automated tricycle repairs, truck repairs and vulcanizers. These auto mechanic workshops are mostly located by the roadside whether in the residential or commercial zones of the case study area which choice of location is not accidental but intentional because they get a high level of patronage by the roadside.

Also, their mode of waste disposal shows a high level of ignorance about the negative environmental effects of their generated waste on themselves as well as on the general public. Finally, the acceptance of relocation to specific sites called mechanic villages by the interviewed auto mechanics is because in their opinion, a mechanic village is a welcome sign of progress.

Conclusion and Recommendations

The concept of environmentally friendly mechanic villages is a 21st century strategy to improve global environmental quality which is consistent with the United Nations' framework convention on climate change, control of harmful substances and hazardous waste, as well as sustainable development. The concept creates an enabling environment for better investments that would attract highly qualified and educated individuals into the business of automobile maintenance. This will create more employment and will contribute to poverty alleviation as mechanic villages may be described as a training center reachable to the ordinary citizen. It is anticipated that this environmentally friendly mechanic village concept may be adopted by the relevant authority in the study area, Sabon Gari L.G.A. Council. Having established the various aspects of auto mechanic activities in Sabon Gari L.G.A., spatial extents, problems, prospects and physical planning measures, the following recommendations are made:

Physical Planning Measures

Firstly, there is need for designated mechanic villages in the study area. These mechanic villages should be integrated into the Zaria Master plan which has been overdue for review. The urban planning authorities need to include the auto mechanic service industry in urban planning and management as well as formulation of development plans and action plans for all urban land uses.

Secondly, there is need for the federal government to strengthen the executive capacity of urban local government authorities to enable them perform their statutory functions as well as increase the

quantity and improve the quality of man power needed for urban development and management. Furthermore, adopting car free principles in the long term urban design or redevelopment of the municipality would completely take care of the problems that result from auto mechanic activities in the study area.

Institutional Measures

The planning authorities need to regulate, control and manage mechanic activities for an enhanced environment through the establishment of appropriate institutional frame work to ensure orderly development and efficient arrangement of the urban area. There is also a need to revise existing planning laws and regulations in order to ensure their adequacy in addressing current urban development problems.

Furthermore, relevant government agencies like the Ministry of Commerce and Industry in conjunction with the Urban Planning and Development Authorities should enact laws restraining any auto technician from operating a repair centre outside a mechanic village. This will solve some of the problems they face such as acquisition of land, inadequate facilities and haphazard location of workshops in urban space.

In conclusion, there is need to strengthen the capacity of all agencies and bodies charged with the responsibility of monitoring the implementation of all existing Federal government policies related to urban development as well as an urgent need for an urban policy that ensures strict commitment to plan implementation especially in the relocation of auto mechanics to designated mechanic villages.

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