

Environmental Awareness in Motor Vehicle Garages in the City of Mbeya, Tanzania

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Abstract: *The study focused at examining the extent of environmental awareness in Motor Vehicles Garages in Mbeya City. The study used structured questionnaires, interviews and observation to collect data. A total of 41 Garages and 12 Car wash sites were surveyed. Study revealed that a total of 51,300 litres of water were used for cleaning 1026 cars per week; with high risk of health problems, due to contamination. The study also revealed that efforts by government has been at place, these effort includes training the garage owners, sales of some waste products to some companies for recycling purposes. The study identified challenges facing the garages this included many garage sites were built in residential areas, poor record keeping of waste products etc and this was partly contributed by their poor academic backgrounds, which did not cover environmental issues in detail. As a result many garages had poor management of waste generated in their working places. This study recommended that more efforts should done by Mbeya City authorities to provide environmental awareness to Garages employees and communities around.*

Keywords: environmental awareness; environmental impacts; motor vehicle garages; car wash

1. Introduction

We are the error that whereby the knowledge of human health is at risks due to environmental exposure to hazardous chemical (Franco *et al.*, 2008; Akan *et al.*, 2009). Many garages are exposed to chemical substances that can cause incurable disease (Hirvonen, 1995). Effects of an exposed population can only be studied relevant biological parameters with a short term manifestation resulting from the exposure can be identified. The obtained results will alert as an early indication of possible risk of health problems developing in the long run. Exposure to a wide range of garage waste chemicals including heavy metals, contained in brake fluids, degreasers, detergents, lubricants, metal cleaners, paints, etc, solvents, results in various forms of chronic poisoning.

The increase of Motor Vehicles utilization has increased environmental impacts in different communities. This is due to the increased waste products as the consequence of Motor Vehicles.. Lack of possessing modern scientific equipment to test the environmental impacts scientifically is a major challenge to Tanzania as Motor Vehicles increases The is no major difference on environmental impacts between Europe or Mbeya. In Tanzania there is no Motor Vehicle Industry always imports. For that matter what affect Europe affects Tanzania as well, therefore Mbeya stands a better chance of studying and implementing environmental mitigation measures before it is late. It is in this consideration that this research was done, focusing in increasing the quality of the life of the human being are related creatures such as animals and plants.

2. Research Methodology

This study adopted survey research methodology to collect relevant data. This included qualitative in-depth Interview and questionnaire distribution to different garages. Garages supervisors which were fourty one (41) and car wash sites which were twelve (12) were interviewed for specific questions give detail and wider range of information

particularly on environmental mitigation measures taken by the garage. Quantitative data were analyzed using Microsoft Excel version 2010; data were organized and presented in tables. Qualitative data analysis were analyzed and synthesized from multiple angles depending on particular questions being addressed.

3. Research Findings and Discussion

The research findings indicated that working employees of many garages ranged between 6 to 20 employees of which many had no Personal Protective Equipment (PPE). Employees were exposed to personal accidents and possibility of destroying equipment in the working place. Equipment such as arc welding machine was unprotected. The potential health implications were not known to many employees as well.

Waste Management Assessment

Most garages generated hazardous waste, such as used oil, wastewater, air emissions, and pollutants, painting parts etc. Waste management practices in the garage sector were a relatively unknown entity. The finding shows that there were wide ranges of waste management practices in place ranging from the good to the poor. This range of different practices gave an opportunity to understand the poorer performers involved. Smaller garages were not doing everything in accordance with the law whereas the large ones were. Charges for poor environmental varied between the different garages and were done at court of law in case there was a violation of law. Court penalties started from TZS100,000/=.

Solid waste generated by Garages in Mbeya City was undertaken by City authority. The rapid growth of Mbeya city calls for an alternative urban strategic solid waste management. Because of its incapacity (vehicles) and increasing of urban human activities, the City Council has not been able to cope with the generation of solid wastes due to poor transportation. The waste was seen lying in heaps and scattered at the unscientifically designed dust bins

giving unsightly appearance besides causing nuisance and unhygienic conditions.

There was no solid waste separation system while collecting garbage, for instance Garage cabbages were put together with other sources of garbage. Open trucks loaded with garbage was used, which emanated fowl smell and cause nuisance to people. At places where cover material was arranged, covering of trucks was done half-heartedly and nuisance continues.

Car Wash Sites

Out of twelve (12) car wash sites; four (4) of them were at garages and eight (8) at the River. Generally, workers ranged from six (6) and maximum were thirty (30), none of them did wear neither PPE nor uniform.

Many cars were seen at the site, from private to governmental cars. Workers used water from the nearby Rivers and while other used water from the Water Department Authority in the City of Mbeya. Rivers were contaminated with sewage systems and toilets from nearby buildings. Waters from the rivers were used for irrigation to domestic gardens.. In another development used water for cleaning cars, return back to rivers, polluting the rivers

Research findings indicated that different types of Motor Vehicles used different amount of water. For instance at least fifty (50) litres were used to clean a small sized car.. There are three (3) type of rivers used namely (Mbalizi, Nzovwe and Meta Rivers) flew water to Lake Rukwa, via Songwe River. Research reveals that, a total of 1,026 cars were washed and water used ranged between 45,300 and 6,000 litres polluted the Rivers as shown in Table 1.

Table 1: Number of Cars Washed

Location	No of Sites	No of Cars Washed/ Wk	lts/wk	Final River
Mbalizi	1	84	4,200	Songwe
Iyunga	2	78	3,900	Songwe
Nzovwe	1	54	2,700	Songwe
Forest	1	66	3,300	Songwe
Mwanjelwa	1	96	4,800	Songwe
Soweto	2	198	9,900	Songwe
City Centre	2	330	16,500	Songwe
Uyole	2	120	6,000	Great Ruaha
Total	12	1026	51,300	

Source: Field work 2014

Understanding the environmental issues at the Garages

Based on focused group, research findings indicated employees were satisfied with the environment at working places (Garages). However the understanding to environmental was limited to cleanness to their working places. The idea of an environmental keeping was not well received, it was considered as an additional cost. Idea of training providing seminars for environmental keeping was well received - especially if there was a cost saving potential. This suggested that there is need to introduce environmental studies possibly from primary school levels. It further suggested that impact of educating people in environment issues, e.g. using TV, Radios, News papers etc has not been effective enough.

Impact of Pollutants from Motor Vehicles Garage

Research findings indicated that the management of hazardous wastes varied. In smaller garages managed well waste oil, by keeping them in a special container.. Approximately 4060 litres of oil was collected from 41 garages in Mbeya city per month, as shown in Table 2.

Table 2: Used Oil drained from cars

Location	Garages	Appr. Lts/Month			Total Lts
		60	100	140	
Mbalizi	3	1	1	1	300
Iyunga	5	3	2	0	380
Nzovwe	5	3	1	1	420
Forest	3	1	0	2	340
Mwanjelwa	3	0	2	1	340
Soweto	12	5	3	4	1160
City Centre	7	1	3	3	780
Uyole	3	1	0	2	340
Total	41	900	1200	1960	4060

Source: Field work, 2014

Also the research finding revealed that some of the used oil obtained from the Garage was used to remove dust from garage sites. Used Oil from Engines according to Franco, et al., (2008) contain so many metallic particles, such as lead, Iron, hydrocarbons etc, which have a variety of impacts on the environment. This includes destruction of wildlife habitation, erosion, sedimentation, pollutant loading of groundwater and surface water, underground sources of drinking water etc. Since tap water system is not well distributed in Mbeya City, most of the residents were at risk of their health. Also the working environments were not clean and poorly attracted to customers.

Burning Organic Products Management

Food leftovers such banana, oranges and many more were collected and burnt in nearby Landfills. The burning was supported by used oil, producing unpleasant fumes to the environment. The burning was as well supported with used tyres which were no longer needed, causing unhealthy situation to workers and other neighbours around. Sixty percent (60%) of garages lacked ventilation at the body building and paint spraying workshops and therefore exposing workers to more risk.

Impact of Solid Waste Landfills

Landfills posed environmental risks to human health and the environment. While modern landfills are equipped with pollution control devices that minimize environmental releases, this was not the case with Mbeya City, thus several potential environmental effects existed. These included groundwater pollution, surface water contamination, explosive hazards, and nuisance factors (such as noise pollution, unpleasant smells, dust, and blowing litters). Wastes that either contained hazardous constituents or those that can mobilize hazardous constituents in landfilled wastes, present the most environmental risk.

Impact of water used for Car washing

Wastewater from car washing sites contributed a lot of risk environment to people, plants and other species using water from rivers in the city. As shown in the figure 3,

Banana Plants *Migomba* were at the high risk heavy metals which have negative effect to human health.

Results of this research showed that all rivers used for car washing were polluted. Apart from waste products from garages, car washing were connected to the toilets where Rivers passed by. For instant, Most of the Toilets in Mwanjelwa and Mabatini, their waste sewage systems are illegally connected to River Meta and River Nzovwe respectively, (see figure 1). However the same water is used to cleaning vessels, swimming, cooking, watering domestic garden and taking bath, farming etc, see figure 1.



Figure 1: Plants along River Nzovwe Source: *Field work 2014*

According to Ermens, (2007), the most common contaminants in car wash water include: metals, polycyclic aromatic hydrocarbons (PAHs), and detergents/surfactants. The predominant metal contaminants in diffuse urban runoff are copper (Cu), lead (Pb) and zinc (Zn) and these also constitute the dominant metal contaminants reported in car wash water. Zn is derived mainly from vehicle tyres and Cu from brake pads (Moores, 2010), result from (incomplete combusted) exhaust emissions being deposited on car exteriors, while detergents and surfactants are ingredients in car washing products. Water in the Rivers were used for plantation, animal feeding and family domestic use. As a result of this contamination, residents are more affected because they eat fish contaminated with heavy metals and likely they are going to affect their health with deadly diseases such as cancers, killing of some plants within or along the river.

Impact of Car Painting

Anytime painting was done to Cars; additional wastes were generated, which included waste paint, paint cans laden with primer and paint, paint-thinner mixtures generated from cleaning paint guns, and soiled air filters from the ventilation system in the paint booth. Due to the lack of Personal Protective Equipment (PPE) most of workers in garages suffered persistent cough; Breathlessness; Flu-like shiver,

Environmental Control Measures Taken

Research finding reveals that efforts have been done to mitigate environmental impacts to Garages sites that included:-

The sale of Used Solid Products for recycling

Sales of Solid waste products, such as Radiators, Batteries, Plastics Materials, copper, Iron, Brass, etc has increased preservation of environment. All garages under this research were aware of the business of the waste products from their working. The study found eight (8) companies used to buy solid waste products. Four (4) of them were from Mbalizi and the other four were at Soweto Area in the city. All these companies were taking waste products to Dar e Salaam city for recycling. It was difficult to quantify to establish the amount of solid waste collected by the companies for recycling, for it was regarded confidential by companies.

Health officers

Research finding revealed that City Authorities, frequently visited Garages to inspect and instruct better practice on environments in working places. This study revealed that garages were fearful of health officers. Garages that failed to keep their environments in order had to suffer punishments from city authorities. One supervisor of a certain garage has been taken to the court of law four (4) times, on the same issue of poorly keeping his working environment.

Lubricant Sellers

The study showed that companies dealing with selling oils provided training to their customers. They provided lessons on how to use oil, drain and preserve it after using. Garage supervisor acknowledged to have attended the seminars organized by them. These companies included SHELL, BP and ESSO to mention some. To a large extend, these companies have boosted the knowledge for environment in the working places; such as Garages.

Challenges

Based on observation, it was revealed that most of Lubricant selling companies had concentrated in bigger Garages leaving small garages unattended. In Social issues and economic sustenance it was key obstacle of environmental keeping. For instance, using political party flags as a defense. Based on fact of background poor record keeping of waste products to garages was a problem, therefore hindering proper estimates of possible health effects

Furthermore lack of education and knowledge particularly on the consequences of poor environmental keeping was poor to many employees; garages were built within residential areas and most of the working Garages sites were hired, suggesting difficulty for expansion for the fear that the owner of the house might decide to change the business. Finally, Sale of used oil; was not appropriately used by oil buyers; particularly local citizens, many used for treating wood etc.

4. Conclusion

This study focused on understanding the environment awareness in the garages. The results indicated that many garages had poor management of waste generated in their working places. The study also revealed that some practical mitigation process practiced by garages were relevant. This included the selling of used solid products to companies for recycling. In additional to that the study revealed that City Authorities had periodic visiting to garages for inspection.

This enhanced the environmental keeping attitude to the Garages. Also companies used to sell Lubricant have been visiting the garages to educate on how to use and preserve used oil used. This accounted as successful steps done by garages to enhance the environment keeping in their working areas.

5. Recommendation

This study recommends that Lubricants sellers and City authorities should keep on providing environmental awareness to Garages employees and communities around garages. Also researcher recommends that garages should be located differently from residential areas this approach will minimize the possible negative health effect to residents. Local environmental authorities should repair and/or install sewerage system and associated infrastructure, and finally recommends that a conduct research to identify environmental harms affecting human populations caused by nearby garages.

References

- [1] Air Pollution. *Think Quest*. Retrieved on 5 August 2014 from http://library.thinkquest.org/26026/Environmental_Problems/air_pollution.html.
- [2] Ermens, R. (2007). Literature Review: Urban River Contaminants. Prepared by URS New Zealand for Environment Canterbury. *Environment Canterbury Report No. U07/100*
- [3] Moores, J., Pattinson, P., Hyde, C. (2010). Enhancing the control of contaminants from New Zealand's roads: results of a road runoff sampling programme. *New Zealand Transport Agency research report 39* retrieved from <http://www.nzta.govt.nz/resources/research/reports/395/docs/395.pdf> August 2014.
- [4] Regan, (2012), Study of Maintenance Competences of Automotive Mechatronics; Case Study Mbeya City; Available at Mbeya University of Science and Technology
- [5] Akan, J.C., F.I.A. Abdulrahman, V.O. Ogugbuaja and J.T. Ayodele, (2009). Heavy metals and anion levels in some samples of vegetable grown within the vicinity of Challawa industrial area, Kano State, Nigeria. *Am. J. Applied Sci.*, 6: 534-542. DOI: 10.3844/ajassp.2009.534.542
- [6] Franco, S.S., A.C. Nardocci and W.M. Gunther,(2008). PAH biomarkers for human health risk assessment: A review of the state-of-the-art. *Cad. Saude Publica*, 24: 569-580. PMID: 18797723
- [7] Harrington, W and McConnell, V (2003), Motor Vehicles and the Environment, RFF Report, April