

**ENVIRONMENT AND RURAL INFRASTRUCTURE  
STUDY ON SMALL SCALE ROAD SIDE METAL  
WORKSHOPS IN FARIDPUR**

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**Introduction**

Micro and small enterprise comprises over 98 percent of all industrial units in Bangladesh. They are responsible for the creation of four out of five industrial employment and account for over 46 percent of the industrial contribution to gross domestic product of the country. Small metal workshops in urban or semi urban areas create employment for thousands of poor and marginalised low skilled people.

Though there has been considerable research done on various aspects of small enterprise and related aspects: employment, income, marketing, entrepreneurship development, innovation, finance, technology transfer etc unfortunately research on the environment and its interrelationship with infrastructure aspects of small scale enterprises has almost been non-existent. Following the traditional perspective that environmental impacts have only two dimensions internal and external, the building technology prevalent in the workshops and their resultant environmental implication has not been adequately analyzed.

It is now being increasingly recognized that though environmental effects emanating from the operation of small enterprises are local they can in most cases be very significant in aggregate and therefore effective and timely interventions could prevent significant environmental harm. Moreover in most cases these interventions can be financially affordable and therefore cost-effective.

The deregulated nature of the informal sector in Bangladesh and the pressure of not to add non-essential costs usually lead to disregard to environmental issues. It is therefore possible to create awareness leading towards development of 'no-cost' or 'even-saving' devices that improve the working environment. For example well laid out tidy workshops is the safe to work in and therefore most productive. Good practices as regards to welding in open spaces for example is harder to sell as a cost effective option but can be presented as best practice which can minimize health hazard of the workers.

The Light Engineering project (LIP) undertaken by the Intermediate

Technology Group Bangladesh (ITDG) project aims to improve the choices, independence and quality of life for those who operate within and are customers to the small scale metal workshops in Faridpur district of Bangladesh. Increase in income and employment is therefore the project objective. Small-scale metal workshops, most of which operate as an informal sector contributes substantially to the economic development in the project area

The key areas of work of the project is conducting training courses on the identified needs of the artisans for skill and product development, business plans which include cost management and marketing, association building and the establishment of tool hire center etc. Faridpur has been selected as the project site as it is in one of the greater districts of Bangladesh, well connected with other parts of the country.

A significant majority of the population of Faridpur is traditionally engaged in agricultural activities, although over the last two decades, a large number of poor people have initiated small 'off-farm' productive activities in towns like Faridpur. This is due to a rapid shrinkage in the agricultural employment as well as relative less cost of establishing businesses with low initial capital investment. LIP project outputs are designed to enable small scale enterprises increase their capability and capacity for making innovative and better products and therefore be able to compete in market.

A questionnaire was prepared for the collection of data from owners / workers of 70 sample workshops. The purpose of this research is to discuss all activities carried out by the workshops, their infrastructural aspects, materials used, waste generated and methods of disposal, based on which some intervention procedures are suggested.

### Methodology

A detailed land use survey was conducted using enlarged mouza maps of the relevant area. The field maps were analyzed cartographically and digitized for producing GIS maps of the study area.

Representative soil and water samples were collected during the field survey and later for environmental parameters.

Air samples were collected at two locations and analyzed for NO<sub>x</sub> (all oxides of Nitrogen), SO<sub>x</sub> (all oxides of Sulfur), and Total Suspended Particulate (TSP).

### Baseline Environmental Condition

The baseline environmental situations of the survey area were studied in terms of certain criteria, which are as follows:

### General setting

The workshops considered for the present study fall under four mouzas (Gopalpur, Moira Patti, Chawkbazar and Paschim Goalchamat) as well as Ward No. 1, 2, 3 of the municipality. The selected workshops are situated on the bank of the river in the vicinities Kumar and of the Kumar, Sheikh Mujib Road, Barisal Road, Bus Stand area, Rajbari Square, Goalchamat road and northern side of Alipur Bridge. Most of the study area is densely populated.

### Topography and Drainage

The study area is located in the floodplains of the Padma and the Kumar and has low plain topography. However, much of the natural topography is now altered due to human interventions. The Padma and the Kumar with its few canals form the drainage system of the study area.

### Physical infrastructure and Natural Hazards

Infrastructure of the workshops is non-engineered. The shops are basically thatched and do not possess any lateral load resistance mechanism. These structures can rarely survive even a moderate intensity cyclone. Lack of stability is therefore a major problem. This is more vividly observed during frequent disaster that hits Faridpur.

Faridpur is situated in one of the most disaster prone areas of Bangladesh. It frequently experiences floods and river erosions. It is also hit by sporadic tornadoes.

The workshops along with other houses in the vicinity are damaged and demolished during these catastrophes. Every year many workers become unemployed during disasters.

Traditional materials like bamboo, jute poles, woven bamboo, mud, thatch, timber are used with C.I sheet to construct the workshops. There is no ventilation or window. Lack of space is another major problem in workshops. Floor is composed of mud plinth. Bamboo frames are often weakened by poor quality of materials.

Since the materials are used without preservation and treatment the structures collapse within a few days. If bamboo is treated by spraying appropriate chemicals onto the completed roof, it would be fire resistant and waterproofed. Fire is a main hazard in metal workshops and this will help the workshops to minimize risk of hazards.

### Artificial Hazards

Fire

Electrical

Mechanical  
Lack of Space

### Hazards

Negligence during welding operation, electricity short circuit can cause fire hazard since most of the workshops have no fire extinguishing arrangement. Moreover the workshops are located in highly dense area which increases the possibility of serious accidents.

Moreover the workshops are clustered, therefore making it possible for fire to spread. So even if the question of hazard is addressed in one of the workshops by procuring fire-fighting appliances the resultant benefit will be minimal. An effective hazard management system needs to address the need of the whole community. All the stakeholders need to be consulted for making it effective.

Lack of right insulation, loose connection, illegal connection, voltage oscillation can cause serious accident. Inappropriate machine and their operation, lack of awareness and poor house keeping is also dangerous for the safety of the workers.

### Wastes

Three types of waste such as, solid, liquid and gases are associated with the types of activities and equipment/instruments used in these workshops.

Solid waste includes, among others, metal dust/metal filings, metal pieces that mostly originate from machine and repairing workshops.

Liquid waste includes used oils, lubricants, grease, process water etc. originating from washing, servicing of engines and equipment, repairing, painting etc.

Gaseous waste includes aerosol of paints, chemical fumes from welding and exhaust fumes from engine repairing and overhauling etc.

### Environmental Impacts

Most of the waste produced are either reused by the workshops or collected for recycling. Almost the entire quantity of major liquid waste produced by the workshops is either reused or recycled. The liquid waste is used for cleaning spare parts and as lubricants of cartwheels etc.

### Water quality

The surrounding water bodies in the area consist of part of the Padma and the Kumar, few canals, beels, ponds and roadside pits. The waste from the

workshops does not pose any serious problem to the surrounding water bodies as there is no indication of these water bodies receiving the waste from the workshops, because most of the waste is reused or recycled and the rest remain on the floors of the workshops.

### Soil quality

Analyses of selected soil samples show that the soil of the study area is contaminated with waste generated by workshops, which is evident from the presence of some heavy metals, iron and manganese. The pH (acidity) of the soil is around the normal value (7).

### Air quality

The background air quality in the study area is affected by various kinds of sources, mainly due to vehicular traffic as the workshops are located along the roads of high to moderate traffic density. The amount of Total suspended particulate is higher than that of the Bangladesh Standard Value.

### Occupational Health and Safety

Health and safety issues mainly arise from the use of machines, washing by lubricant oils as well as due to constant exposure to hazardous waste from several machines and processes involved in various activities. Particularly, among the workers, the most vulnerable are the underage trainees who are likely to be the most affected. Moreover as the floors of the workshops are earthen they become muddy and wet during monsoon. This creates bigger problem if the workshops are flooded by any chance.

The health and safety issues are as important as the environmental issues in the workshops. Major health hazards arise from the following operations:

- Welding without adequate protective measures can cause serious eye problems due to exposure to glare of welding arc and burns etc.
- There are several health hazards in drill operation. Excessive exposure to ambient heavy metal dusts can cause serious respiratory diseases, eye problems and accidents.
- Lathe machines can cause similar health problems like drilling does.
- Blacksmiths are exposed to excessive heat and dust and as a result most of them are likely to have respiratory diseases at an advanced age.
- Paint aerosols produced during spray painting can cause eye and respiratory problems.

- Long exposure to lubricant oils during washing of engines, tools, equipment etc. can cause skin diseases as they contain toxic chemical additives.
- Power disruption with voltage fluctuation is a common occurrence in the workshops. The workers have to work in insufficient light, which can cause eye problem. In
- Most of the workshops are packed with different instruments / machines, leaving very little working space for the worker which can cause accidents.

### Environmental Management Plan (EMP)

The following Environmental Management Action Plan (EMP) suggests a series of implementable actions that would minimize or mitigate adverse environmental impacts of different activities carried out by the workshops. It also explores the possibility of minimizing negative health hazards associated with the activities of the workshops and identifying ways through which workers and owners can share responsibilities for implementation of the EMP.

Solid waste such as metal dust and cuttings generated from various operations should be collected and stored in an environmentally sound way, so that maximum amount could be reused and recycled. To put this into place, good house keeping within the workshops needs to be practiced, and awareness on environment should be raised. To avoid health hazards and accidents, skilled labourers should be employed. The maintenance of machines needs to be undertaken regularly. Adequate First Aid kits need to be kept in the workshops

During welding, adequate safety equipment such as gloves, masks etc. should be used to protect eyes from glare of the welding arc, burn injuries etc. All electrical connections should be proper and regularly checked. Awareness on environmental impacts and health hazards should be imparted to the workers.

Toxic lubricant is for washing machines and tools, which can cause severe skin diseases if the body parts are not properly protected. Contact with these sort of hazardous substances over long periods should be avoided as far as possible and hands and faces should be washed soon after touching these materials. Residual oil should be reused / recycled as much as possible and should not be thrown into the open environment.

Masks should be used while painting with spray to avoid inhaling paint aerosols. Others should perform painting activities inside the workshops to avoid inhaling paint aerosol.

Workers need to be educated on fire hazards. Adequate basic fire fighting tools such as sand and water should be kept in each small workshop. In case of

bigger workshops, fire-fighting equipment should be kept. Electrical connection should be checked regularly. Provisions of First Aid should be kept in the workshops.

### Conclusion

The mitigation measures suggested above can be implemented only if. Workshop owners are motivated to implement them. Initiatives to raise awareness regarding environment, occupational health and safety should be taken and necessary training should be arranged. The workshops should cater for adequate fire fighting provision. In this the owners need to be made aware that proper and durable infrastructure also means economic gains.

The responsibilities of implementing the EMP rest mainly with the workshop owners and workers. ITDG can also shoulder some responsibility by providing training on raising awareness on environment, health and safety. It is obvious that the workshop owners, particularly those with small capital might need some investment support for making provisions for the facilities within their workshops.

ITDG can motivate its partner NGOs to provide support through credit for buying materials and also for improving the infrastructure of the workshops. In this regard ITDG can work also as a mediator between commercial financial institutions and owners of workshops so as to enable the latter for procuring credit in order to make the physical infrastructure of the workshops more stable and durable. Emphasis needs to be put on stabilizing the floors by cementing materials at the very least.

For providing technical training the existing NGO facilities in Faridpur could be accessed. District level Fire Service and Civil Defense offices could be consulted for training on fire fighting.

Environmental appraisal is part of a multi-disciplinary approach, which addresses economic, social, infrastructural, ecological, legal and technical issues. This study has shown that environment and physical infrastructure are closely interrelated and therefore need to be addressed effectively from outset.

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