

ENVIRONMENTAL IMPACTS FROM INDUSTRIAL OPERATIONS:
A CASE STUDY OF FOOD PROCESSING INDUSTRIES IN NIGERIA

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ABSTRACT:

This paper presents some of the preliminary findings of the environmental impact assessment (EIA) of food processing industries in Nigeria. The study was designed on the basis of Investigative Survey Research Approach. The approach entails the schedule of a series of visits to food processing industries of interest. It was aimed at the assessment of the environmental impacts from industrial operations. Impacts from industrial operations on socio-economic environment, water resources, soil and air quality were identified. In order to protect the environment from the adverse effects of industry programmes and project a number of mitigation measures have been recommended.

INTRODUCTION:

The need for assessing the environmental impacts of industry has been recognized by UNEP's Governing Council which requested practical recommendations and criteria to meet this need (UNEP/GC, 1990). Industry and industrialization are a major activity promoted by governments in their development strategies and make a significant contribution to the enhancement of human welfare.

Industrial operations/processes invariably involve the conversion of raw materials and resources into semi-finished and/or finished products. As the conversion can never be completely total, residues in the form of energy and matter, will be formed. If the residues are not utilized they become wastes, and, if discharged into the biosphere, can become pollutants (World Bank, 1978). The degree to which the pollutants affect the physical environment depends upon their quantitative and qualitative characteristics as well as the receiving media. Some pollutants are readily biodegradable, while others persist for a long time and may not even decompose. Also, some pollutants have low toxicity, whereas others are highly toxic or carcinogenic in trace quantities. As measurements, monitoring, analytical and bioassay techniques improve, the ecotoxicological effects of pollutants also become better known.

In addition to effects on the physical environment, industry and industrialization also have societal impacts. Their impacts are generally much more difficult to assess and often cannot be perceived at the initial stages because of complex interacting, synergistic and symbiotic factors which do not follow any set rules. As these societal impacts can be very significant, they need to be considered at the national level of strategy formulation and policy making (Barnor, 1993; Cooper and Otto, 1977).

The area in which an industry will be sited will have an important effect on the subsequent

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environmental impacts. The environmental criteria for siting industry are, therefore, closely related and similar to the factor that should be considered for an environmental impact assessment. With regard to the physical aspects, if the plant is constructed in an ecologically fragile area, with poor assimilative capacity, then the impacts would be less pronounced. Similarly, if the area already has an established socio-economical structure with schools, houses, health services, sewerage and water supplies, etc. as well as an existing population with industrial jobs, then the societal impacts caused by a new industry will be less and the marginal effects may not be noticeable (UK Department of the Environment, 1976).

If there is no existing socio-economic provision in terms of buildings or community services then it is essential that the development of these facilities should be carefully planned and co-ordinated along with the industrial development itself. As long as this is carried out there should be no predisposition to select a site close to an existing urban area. Also, an existing infrastructure means an increased probability for the new industry of operating efficiently and successfully. This in turn means that environmental impacts can be better assessed and evaluated, since a legislative, administrative and technical framework already exist (FEPA, 1995).

Generally, the fact that industry produces physical and societal changes is acknowledged. At issue is the degree of change, and whether these changes can be assessed and evaluated before they occur, so that they can be better controlled and managed. To be able to manage environment and development in a country, there should be national, and where appropriate, regional principles, objectives and goals (UNEP REPORT NO. 3, 1978). Their existence would provide the necessary framework in which strategies, programmes and action can be planned and implemented.

METHODOLOGY:

This study was designed on the basis of Investigative Survey Research Approach (Anazodo, 1975, 1983). The investigative survey research approach for obtaining data entails the schedule of visits to food processing industries of interest. The tasks accomplished during such visits include: administering and completion of questionnaires, interviewing relevant and competent staff of the industries and residents of the industrial area, inspection and physically witnessing processing operations and taking relevant measurements. The data could be qualitative or quantitative.

RESULTS AND DISCUSSION:

Industry development programmes and projects lead to a number of potential environmental impacts. These include:

1. Socio-economic impacts.

The positive socio-economic impacts are:

- (i) increased opportunities for income generation and wealth
- (ii) increased wealth
- (iii) increased goods and services
- (iv) increased access, particularly to previously inaccessible areas
- (v) introduction of secondary development peripheral to, or related to, the industrial activity by new access roads, utilities and town sites established to serve industrial facilities
- (vi) increased propensity for entrepreneurial activity and for trade and commerce
- (vii) increased rate of urbanization and contact with urban society.

The negative socio-economic impacts are:

- (a) conflicts with existing land uses and local populations
- (b) resettlement
- (c) damage to cultural sites
- (d) increased demands on local services and facilities from workforce on local communities
- (e) social and cultural conflicts within local population, and between local population and industry workforce.
- (f) community institutional instability
- (g) removal farm labour thereby reducing food security
- (h) human health impacts. These include: respiratory problems through high concentrations of SO_2 , particularly when associated with emissions of particulates, or through irritant dusts; SO_2 affects agricultural productivity and plants in general; severe burning and blindness through mineral acids such as HCl , HNO_3 , H_2SO_4 , H_3PO_3 and accident risks (fire and explosion accidents/hazardous material).

2. **Impacts on Water Resources:** These include:

- (i) Deoxygenation by biodegradable substances, leading to asphyxiation of fish or increased toxicity of pollutants.
- (ii) Increase of nutrients in the ecosystem
- (iii) Discharge of wastewater at detrimentally high temperature, encouraging biodegradation and reducing oxygen solubility
- (iv) Changes in turbidity and colour by suspended and dissolved solids, blocking sunlight and reducing photosynthesis, or interfering with feeding and breathing of aquatic fauna.
- (v) Contamination of surface water, poisoning aquatic flora and fauna
- (vi) Change of pH levels
- (vii) Contamination of groundwater, e.g. from slurry ponds or solid waste refuse sites, rendering it unfit as drinking water source
- (viii) Damage to sewerage systems
- (ix) Change of hydrological regime

3. **Impacts on Soil**

- (i) Deposition on land sites of contaminated solid wastes has a deleterious effect on the quality of adjacent soils and restrict future land use both in the short and long term, particularly for agricultural purposes.
- (ii) Leachates from solid wastes dumping with direct toxicity or effect on soil pH, can prevent vegetation from growing.

4. **Impacts on Air Quality**

- (i) Climatic impacts: nitrogen oxides, carbon dioxide, methane, chlorofluorocarbons (CFCs) and global warming.
- (ii) Acidification of the environment: SO_2/NO_x .
- (iii) Human health impacts, see socio-economic impacts
- (iv) Odours from storage of raw materials, disposal of wastes on land-sites, and industrial processes.
- (v) Dusts – corrosive (e.g. lime) and irritants (e.g. ammonia).

The siting of the food industries has influenced population structure, population dynamics, land use and settlement patterns, labour supply and employment structure, economic production and distribution, income distribution and consumption as well as social organization and cultural characteristics. It has also led to alteration of hydrological balance, water quality, sediment yield, increased runoff, safety of potable water and recharge of ground water. Water supplies have been endangered by lead contamination in form of leachates.

The slope stability and bearing capacity of soils as well as soil structure have been significantly altered. Air quality has been negatively affected due to increased concentrations of air pollutants such as SO₂, N₂O, NO and NO₂ in the industrial areas.

CONCLUSION AND RECOMMENDATIONS:

In order to achieve sustainable development, environmental impact assessment (EIA) of projects, processes or activities is imperative. The following mitigation measures have been recommended in order to protect the environment from the adverse effects of industry programmes and project.

1. Locate plant to minimize or concentrate the stress on local environmental services and to facilitate the monitoring of discharges.
2. Locate plant in an area not subject to air inversions or to trapping pollution, and where prevailing winds are towards relatively unpopulated areas.
3. Collect particulates by fabric filter collectors.
4. Plan for adequate on-site disposal areas assuming that the characteristics of the leachate are known.
5. Facility should implement a safety and health programme designed to identify, evaluate, monitor, and control safety and health hazards at a specific level of detail, and to address the hazards to worker health and safety and procedures for employee protection.

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