



## RESEARCH ARTICLE

### USE OF MANAGEMENT TECHNIQUES IN INDUSTRIES TO TACKLE ENVIRONMENTAL POLLUTION

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#### ABSTRACT

Industries release many effluents into the environment and cause its degradation worldwide. These industries either don't possess proper environmental management techniques or professionals from environment and management fields. Jammu region is also confronting similar problems related to industrial pollution. This paper is based on a study conducted to find out the use of management techniques in industrial areas of Samba and Kathua districts of Jammu. Total 7 parameters related to management techniques in industries were studied which include JIT approach, ETP availability, ETP operation status, Professional quality managers, Mode of disposal of waste, Buffer stock and Overstocking. The paper put forth some suggestions based on observations to tackle the menace of industrial pollution with the help of proper ecofriendly Management techniques / prevention mechanism to reduce the environmental impacts and safeguard the fragile ecology of this Kandi Belt (Sub-tropical) area of Jammu and Kashmir State.

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#### INTRODUCTION

Environmental pollution caused by different industries has become a matter of great concern world-wide. Rapid industrial growth lifts people out of poverty but also leads to increased environmental pollution. Pollution levels in many developing countries exceed the highest concentration ever recorded in developed countries. So, industrial pollution is fast becoming a major problem in many developing countries. Improper disposal and management of wastes produced by industries is affecting the environment. Global warming, acid rain, ozone layer depletion some of the crucial issues confronting survival of human beings in the present era. Environmental pollution is a major threat to the humankind which need urgent consideration. There is an observed increase in the average temperature of the Earth's atmosphere and oceans in recent decades. It disturbs the ecological balance of the nature. With the rise in temperature, the polar ice caps begin to melt which has led to the rise in the level of the oceans.

It has been recognized that the developing countries lack the necessary information to set priorities, strategies, and action plans on environmental issues. Plant level monitoring of air, water and toxic emissions is at best imperfect, monitoring equipment is not available and where available is obsolete; data collection and measurement methodology are questionable, and there is usually lack of trained personnel on industrial sites (Oketola and Osibanjo, 2009b; Hettige *et al.*, 1994). There are wide ranges of industries and the pollutants introduced largely depend on the type of industry, raw material characteristics, specific process methods, efficacy of facilities, operating techniques, product grades and climatic conditions. The magnitude of environmental pollution problem is related to the types and quantity of waste generated by the industries

and the methods of management of the waste. Industrial revolution followed by the advances in information technology during the last century has radically changed people's lifestyle. Although this development has helped the human race, mismanagement has led to new problems of contamination and pollution. Thus proper management is necessary while disposing or recycling e-wastes ( Ramachandra & Varghese, 2004).

Environmental pollution in Jammu and Kashmir State, particularly in Jammu region due to increase in industrial units and industrial effluents is also taking alarming concentration due to mis-management or absence of proper environment management system, trained environmentalists and managers in the field. The study area falls in Samba and Kathua (Bari Brahmana, Samba and Kathua industrial areas) districts in Kandi Belt (Sub-tropical) having water scarcity and fragile ecology. So, the study was conducted in these industrial areas keep in view the following objectives:

1. To Analyze the Impact of Industrial operation on the Environment of this Kandi Belt;
2. To Analyze whether the Management Techniques are implemented in the industries;
3. To propose the various Management Techniques to Tackle Industrial pollution.

#### METHODOLOGY

##### *Sample Size*

The study aims to analyze whether the management techniques have been adopted by the various industries which release the chemical effluents. In order to find out the results, the data was collected from the industrial area of Jammu, Samba & Kathua

in 2011. This study was initially conducted for a sample size 200.

**Data Collection Instrument**

In order to find out whether the industries have applied for various management techniques or not, a close ended Questionnaire was developed. The use of Questionnaire was found to be useful as it added scope to the study. In addition to the questionnaire, personal interviews were conducted from the concerned In-charge of the industries. On-site Factory visits were conducted for observations.

**RESULTS AND DISCUSSION**

As per the study conducted in the 3 industrial areas (Bari Brahmna, Samba and Kathua) of Samba and Kathua districts keeping in view certain parameters, we came to know that various areas need to have proper attention so as to tackle this menace of environmental pollution.

**JIT Approach:** The just-in-time (JIT) inventory method is an approach where materials, parts, and other goods are ordered only in quantities required to meet immediate production needs. These items are then carefully scheduled to be received precisely at the time they are needed. This increases efficiency, reduces waste, and ultimately minimizes inventory carrying costs. During study, it has been found that only 7% (Table 1, Fig. 1) of the sample taken have applied JIT approach, so a lot of efforts need to be put in this concern.

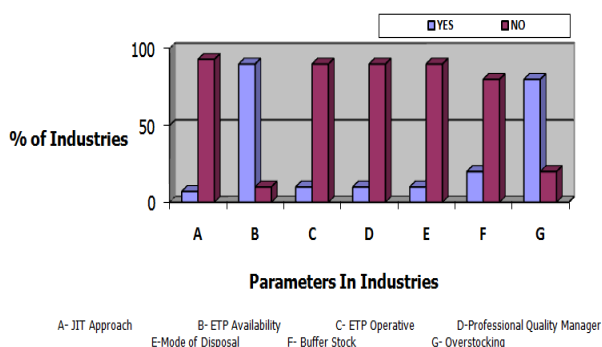


Figure 1 Description of status of different components in industries and their Impact on Environment

**ETP Plant:** The effluent treatment plant is designed to treat the effluent coming from different areas of the plant. During Study, we found that 90% of the industries have ETP Plant in their production site but, it is quite shocking that only 10 % (Table 1, Fig. 1) of these 90 % industries actually have their ETP plant Operative. The main reason behind this negligence is to save the cost because it costs around Rs 1.50/litre for treatment of impure water as per observation.

**Disposal of Waste:** Disposal of waste is an important aspect which should be handled with due care. It has been come to our notice still 90% of the industries dispose off their waste in open area and only 10 % ( Table 1, Fig. 1) of the waste are chemically treated.

**Buffer Stock:** Buffer stock is a stock held as a reserve to safeguard against unforeseen shortages or demand so that production may not hamper. During the study we find that only 20 % industries maintained buffer stock with them which led the remaining 80 % (Table 1, Fig. 1) industries to

overstock raw material which increases the chances of wastage and in turn contribute to pollution. Proper Buffer Stock should be maintained so that there is no need for overstocking the raw material.

**CONCLUSION AND MANAGEMENT**

Management is an essential component to tackle pollution. If proper Management techniques are properly implemented in the organisation a lot of wastage and pollution can be controlled which otherwise contribute to environmental degradation. Some of the Management techniques which should be adopted to control industrial / environmental pollution are as follows:

**Management of Chemical Waste:** Wastes must be stored in containers made of a compatible material. For example, it may not be stored in plastic bottles. All waste containers must have tightly fitting caps and be kept closed at all times except when waste is actually being added. Funnels left in the bottle mouth are not acceptable. Do not overfill liquid containers. To minimize spillage, allow enough air space for expansion. It should not be disposed in the sea. To handle the waste, a management approach should be followed which is discussed as:

**Waste management approach:** A two-tier approach should be thought for waste management, e.g., (a) prevention & (b) control of environmental pollution.

**Prevention-A Waste Minimisation Approach:** This approach focus on reduction and recycling of waste at plant site. Waste Minimisation techniques can be grouped into four categories. These are as below:

- i) Inventory Management and Improved Operations : Proper control over the materials used in the manufacturing process is an important way to reduce waste generation (Freeman, 1989).
- ii) Modification of Equipment: We should install equipment that produces minimum wastes, it should be modified to produce less waste and improved efficiency.
- iii) Production Process Changes: Segregation of wastes should be done, leakage should be minimised.
- iv) Recycling and Reuse : Installation of closed-loop systems, off site should be recycle for use

**b) Control of Environmental pollution:** This approach focus on treatment and disposal of industrial waste. Some steps which need to be taken care are as:

**Collection, Storage, Treatment & Disposal of Wastes :**

- i) Waste Segregation: Many wastes are mixtures of hazardous and non-hazardous wastes. By segregating key toxic constituents, isolating liquid fraction, keeping hazardous streams away from non-hazardous wastes, generator can save substantial amounts of money on disposal or find new opportunities for recycling and reuse of wastes.
- ii) Collection, Storage and Transport: The unsatisfactory state of storage of hazardous wastes can be remedied to a large degree by such low-cost measures as restricting access, fencing off the storage area to minimise any wind-blown nuisance, providing separate covered storage for putrifiable of hazardous wastes, and ensuring regular and frequent collection. The unsatisfactory state of storage of hazardous

**Table 1** Description of status of different components in industries and their Impact on Environment

| S.NO | FOCUS AREA  | STATUS                              | WASTAGE  | POLLUTION |
|------|---|-------------------------------------|--|-----------|
| 1    | JIT APPROACH APPLIED<br>7 %                         | NOT APPLIED<br>93 %                 | Less Applied   | Increase  |
| 2    | ETP AVAILABILITY AVAILABLE<br>90 %                  | NOT AVAILABLE<br>10 %               | Maximum Availability                                       | Increase  |
| 3    | ETP OPERATION OPERATIVE<br>10 %                     | NOT OPERATIVE<br>90 %               | Least Operative  | Increase  |
| 4    | PROFESSIONAL QUALITY MANAGER APPOINTED<br>10 %      | NOT APPOINTED<br>90 %               | Least Number of Industries                                 | Increase  |
| 5    | MODE FOR DISPOSAL OF WASTE OPEN DUMP<br>90%         | CHEMICAL TREATMENT<br>10 %          | Maximum waste is disposed in open area or collected by JMC | Increase  |
| 6    | BUFFER STOCK MAINTAINED BUFFER STOCK<br>20 %        | NOT MAINTAINED BUFFER STOCK<br>80 % | Least Number of Industries maintained buffer stock         | Increase  |
| 7    | OVERSTOCK RAW MATERIAL OVERSTOCKING IS DONE<br>80 % | NO OVERSTOCKING IS DONE<br>20 %     | Maximum Overstock  | Increase  |

JIT- Just In Time  
ETP- Effluent Treatment Plant

wastes can be remedied to a large degree by such low-cost measures as restricting access, fencing off the storage area to minimise any wind-blown nuisance, providing separate covered storage for putrifiable of hazardous wastes, and ensuring regular and frequent collection.

- iii) Combined Treatment Facilitie: Small-scale industries, which contribute about more than half of the total production, also generate huge quantity of wastes. The small-scale industries are not in a position to treat their solid wastes or liquid effluent because of space, technical know-how and financial constraints. It is, therefore, deemed that in a cluster of small-scale industries the different wastes are characterized, identified, quantified and stored for treatment through a combination of recycling, recovery and reuse of resources such as, raw material, bio-gas, steam and manure, besides providing an efficient service facility, to make the system less expensive. The combined effluent treatment plants (CETP) are to be operated by the local bodies, where the cost of construction, operation and maintenance need to be shared by individual industries depending upon the quality and quantity of wastes generated.
- iv) Disposal Methods: Depending upon the characteristics of the wastes, different types of disposal methods can be used for hazardous and non-hazardous industrial wastes. The most predominant and widely practised methods for wastes disposal are : (a) Landfill, (b) Incineration and (c) Composting.

**Reduce Misconception For Plastic Bags:** There is a wide misconception that plastic bags are cheaper & widely available. Proper cost analysis should be done between jute bags and plastic bags and put in front of businessmen .buisnessmen should be made aware that jute bags are cost effective from business point of view. They should be made aware to use jute shopping bags as a promotional tool.

**Professional Quality Manager:** In industries, some professional quality consultant should be appointed who looks after that the use of material should be minimized who spread pollution in the atmosphere or it should be replaced by some other alternative material which is environment friendly.

**Proper Management Techniques:** Proper Inventory Techniques like optimum Stock Level, JIT, Buffer Stock should be adopted to avoid the wastage of material which otherwise would become the source of wastage and pollute the environment.

**Proper Plant Layout:** Plant layout need important consideration to avoid wastage of material as well as time.

**Pollution Prevention Solutions:** Industrial engineers do have unique ways of solving problems and have researched different methods of pollution prevention where they could effectively apply their knowledge. The sections below describe how industrial engineers can play a role in preventing pollution and how they can effectively develop a sustainable process.

**Facilities Planning**

When designing a new facility, industrial engineers will have to ask the question, “How can this facility be designed so that its environmental impact can be at a minimum?” There are factors that need to be taken into account as:

**Space Requirements:** It is crucial to have efficient flow of material and personnel in and out of departments because it will naturally decrease the waste produced by reducing energy consumption and possible work-in- progress (WIP) losses. WIP can be described as products or materials that are being worked on in the system but have yet to be completed.

**Material Handling:** Material handling involves all of the actions taken to move raw materials or WIP within the facility. Engineers concentrate on what materials to move, how to move them, when to move them and where to move them to (Harmon, 2011).

**Total Quality Management:** Total Quality Management (TQM) is a system that is used throughout the majority of manufacturing facilities and can also be applied to managing the effects of waste on the environment.

**Continuous Improvement:** Engineers view continuous improvement with the goal of having zero defects in a product, or in this case, zero wastes produced by the system. When TQM is applied to pollution prevention solutions, it is called Total Quality Environmental Management (TQEM) and introduces the method to prevent pollution wherever possible (Harmon, 2011).

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