

## **Modified EIA for a mechanical project – An innovative method to make the projects Eco –friendly**

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### **Abstract**

**Environmental Impact assessment (EIA)** is an assessment of the possible impact—positive or negative—that a proposed project may have on the natural environment. The purpose of the assessment is to ensure that decision makers consider the ensuing environmental impacts to decide whether to proceed with the project. In general EIA is used to identify the environmental impacts of projects of larger magnitude all over the world owing to their social impacts. Smaller projects which will also affect the environment persistently are normally taken as low key issue in EIA such as Small and medium industries but they are creating permanent environmental degradation owing to their operation methods. Educational institutions are one among the industries where the focus is to be shifted because of the incessant environmental impacts and resource consumption. Normal procedure of EIA cannot be applied to small scale industries (Arquiaga et al. 1992) and educational institutions because of its tediousness, slight modifications are to be made in order to make the whole process simple and applicable to any size of project or operation. This paper gives an insight into EIA, methods of doing EIA, discusses its applicability and also suggests changes to be made in the EIA process to make it applicable to small sized projects.

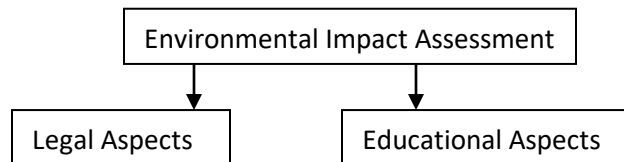
**Keywords:** EIA, assessment, public participation, EIA agencies, environmental impact Management.

## 1. Introduction

An (EIA) is an assessment of the possible impact—positive or negative that a proposed project may have on the natural environment (Bailey 1997). The purpose of the assessment is to ensure that decision makers consider the ensuing environmental impacts to decide whether to proceed with the project. The **International Association for Impact Assessment (IAIA)** defines an environmental impact assessment as "the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made." After an EIA, the precautionary and polluter pays principles may be applied to prevent, limit, or require strict liability or insurance coverage to a project, based on its likely harms. Environmental impact assessments are sometimes controversial.

### 1.1 Aspects of EIA

**Figure 1: Image showing the General EIA aspects of consideration**



The legal one is quite straight forward: to ensure that development projects such as a housing state, a road/bridge or some such construction project has a minimal impact on the environment in its entire 'lifecycle' i.e. during design, construction, use, maintenance, and demolition. Many countries now have laws stipulating that unless an EIA study is carried out (particularly for large infrastructure projects), permission for construction will not be granted by the local authority. But countries in Africa will possibly see EIA processes as a 'hindrance' to development as environment is not yet a priority! The educational one is equally important and probably a forerunner to the legal role to educate everyone one involved professionals and users included, of the potential environmental impacts of anything we do. We need to look at all our daily actions as eventually and cumulatively affecting the environment. This includes our daily choices, where a delicate balance between financial and environmental considerations needs to be made automatically without thinking!

**Environmental Impact Assessment (EIA)** is a tool used to identify the environmental, social and economic impacts of a project prior to decision making.

It aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision makers.

By using EIA both environmental and economic benefits can be achieved, such as reduced cost and time of project implementation and design, avoided treatment/cleanup costs and impacts of laws and regulations.

The key elements of an EIA are (a) Scoping: identify key issues and concerns of interested parties; (b) Screening: decide whether an EIA is required based on information collected; (c) Identifying and evaluating alternatives: list alternative sites and techniques and the impacts of each; (d) Mitigating measures dealing with uncertainty: review proposed action to prevent or minimize the potential adverse effects of the project; and (e) Issuing environmental statements: report the findings of the EIA.

## **1.2 Types of EIA**

Different types of Impact assessment is as listed below but not limited to:

- Climate Impact Assessment
- Demographic Impact Assessment
- Development Impact Assessment
- Ecological Impact Assessment
- Economic and Fiscal Impact Assessment
- Environmental Auditing
- Environmental Impact Assessment
  
- Environmental Management Systems
- Health Impact Assessment
- Project Evaluation
- Public Consultation
- Public Participation

- Risk Assessment
- Social Impact Assessment
- Strategic Impact Assessment
- Technology Assessment

### **1.3 Guidelines in EIA**

Various guidelines on EIA are available. The main steps are as follows:

- Preliminary activities include the selection of a coordinator for the EIA and the collection of background information. This should be undertaken as soon as a project has been identified.
- Impact identification involves a broad analysis of the impacts of project activities with a view to identifying those which are worthy of a detailed study.
- Baseline study entails the collection of detailed information and data on the condition of the project area prior to the project's implementation.
- Impact evaluation should be done whenever possible in quantitative terms and should include the working out of potential mitigation measures. Impact evaluation cannot proceed until project alternative has been defined, but should be completed early enough to permit decisions to be made in a timely fashion.
- Assessment involves combining environmental losses and gains with economic costs and benefits to procedure a complete account to each project alternative. Cost benefit analysis should include environmental impacts where these can be evaluated in monetary terms (see Economic Analysis section).
- Documentation is prepared to describe to the work done in the EIA. A working document is prepared to provide clearly stated and argued recommendations for immediate action. The working document should contain a list of project alternative with comments on the environmental and economic impacts of each.
- Decision making begins when the working document reaches the decision maker, who will either accept one of the project alternatives, request further study or reject the proposed action altogether.
- Post audits are made to determine how close to reality the EIA predictions were.

## **2. EIA around the world**

### **2.1 Current status of EIA legislation in developing countries**

Provisions related to EIA began appearing in developing countries' legislation during the 1970s, shortly after the United States enacted the first national EIA law the National Environmental Protection Act of 1969. References to EIA were made in the environmental legislation of Malaysia, Ecuador and the Philippines. In addition, the Philippines promulgated supplemental legislation which set forth a more detailed EIA procedure. Throughout the 1980s, more countries decided to establish EIA as an element of environmental policy and a legal requirement for proposed development activities. Again, many countries elected to insert EIA provisions within their framework environmental legislation (e.g. Algeria, Costa Rica, Cuba, Guatemala, India, Pakistan, Palau, Senegal, South Africa, Togo, Turkey), while other also elaborated EIA requirements within a complementary decree or regulation (Brazil, Congo, Indonesia, Mexico). Since 1990 the pace of legislative activity on environmental issues has quickened and the number of countries with EIA legislation has increased significantly. Recent framework environmental laws tend to address EIA in more detail (Albania, Belize, Bolivia, Bulgaria, Burkina Faso, Cape Verde, Chile, Colombia, Comoros, Egypt, Gabon, Honduras, Jamaica, Kazakhstan, Kyrgyzstan, Latvia, Mauritius, Peru, Seychelles, Slovenia, Tajikistan, Thailand, the Gambia, Ukraine, Vietnam, Zambia) and more countries have issued EIA laws, decrees and regulations (Czech Republic, Hungary, Mongolia, Nigeria, Paraguay, Russian Federation, Slovak Republic, Tunisia, Uruguay). One country (Zimbabwe) recently has chosen to issue an EIA policy rather than to enact binding legislation. According to information collected by UNEP, EIA provisions now exist in the framework environmental legislation of 55 developing countries. In addition, at least 22 developing countries currently have specific laws, decrees or regulations which contain criteria or procedures applicable to EIA. Other decrees and administrative instruments provided sectoral EIA guideline related to mining, energy, transport, etc.

### **2.2 Status of EIA in India**

Environmental impact assessment (EIA) is a tool that seeks to ensure sustainable development through the evaluation of those impacts arising from a major activity (policy, plan, program, or

project) that are likely to have significant environmental effects. It is anticipatory, participatory, and systematic in nature and relies on multidisciplinary input (Glasson et al. 1994).

The phrase Environmental Impact Assessment comes from Sec. 102 (2) of the **National Environmental Policy Act (NEPA)**, 1969, USA. Some rudiments of EIA are implicit even in early examples of environmental legislation. Napoleon in 1910 issued a decree which divided noxious occupations into categories: those which must be far removed from habitations, those which may be permitted on the outskirts of towns, and those which can be tolerated even close to habitations, having regard to the importance of the work and the importance of the surrounding dwellings. Now the EIA has become a requirement in more than 100 countries (Barker & Wood 1999). In many European countries, it came into vogue with the introduction of the concept of sustainable development after the World Commission of Environment in 1987. In India, though EIA came into existence around 1978-79, it was made mandatory only in 1994. The Environmental Impact Assessment (EIA) experience in India indicates that the lack of timely availability of reliable and authentic environmental data has been a major bottle neck in achieving the full benefits of EIA. The environment being a Multidisciplinary subject, a multitude of agencies is involved in collection of environmental data. However, there is no single organization in India which tracks the data available amongst these agencies and makes it available in one place, in a form and manner required by practitioners in the field of environmental impact assessment in India. Further, the environmental data is not available in value added forms that can enhance the quality of the EIA. This in turn adversely affects the time and efforts required for conducting the environmental impact assessments (EIAs) by project proponents and also timely environmental clearances by the regulators. With this background, Environmental Information Centre (EIC) has been set up to serve as a professionally managed clearing house of environmental information that can be used by MOEF, project proponents, consultants, NGOs and other stakeholders involved in the process of environmental impact assessment in India. EIC caters to the need of creating and disseminating of organized environmental data for various developmental initiatives all over the country. In India EIA is proposed only for the following as of now

1. Industry and mining projects
2. Thermal power projects

3. River valley projects
4. Roads and highway projects
5. Ports and harbor projects
6. Airports
7. Communication projects
8. New township projects

In all the above mentioned the factor to go for EIA is only the cost of the project, with reference to that the EIA is done, but in general there are few industries, operations, project which affects the environment continuously for many years, one such is construction of educational institutions of large size. But the EIA process applicable to all the above projects cannot be directly applied to this and slight modifications are needed to make the EIA via bland less costly also the general EIA process is given in figure 1 (Beauregard 1987), in which's light modifications are to be made to suit the educational institutions. The main details to be collected which are applicable to normal EIA process can also be used which is given below

1. Can the local environment cope with the additional waste and pollution that the project will produce?
2. Will the project location conflict with the nearby land use or preclude later developments in surrounding areas?
3. Can the project operate safely without serious risk of accidents or long term health hazards?
4. How will the project affect economic activities that are based on natural resources?
5. Is there sufficient infrastructure to support the project?
6. How much of the resources (such as water, energy etc) will the project consume, and are adequate supplies of these resources available?
7. What kind of human resources will it require or replace and what will be its social impacts in the short/long run?
8. What damages will it inadvertently cause to the national/regional assets such as natural resources, tourist areas, or historic or cultural sites, etc?

## **2.2 Expert committee for administering EIA**

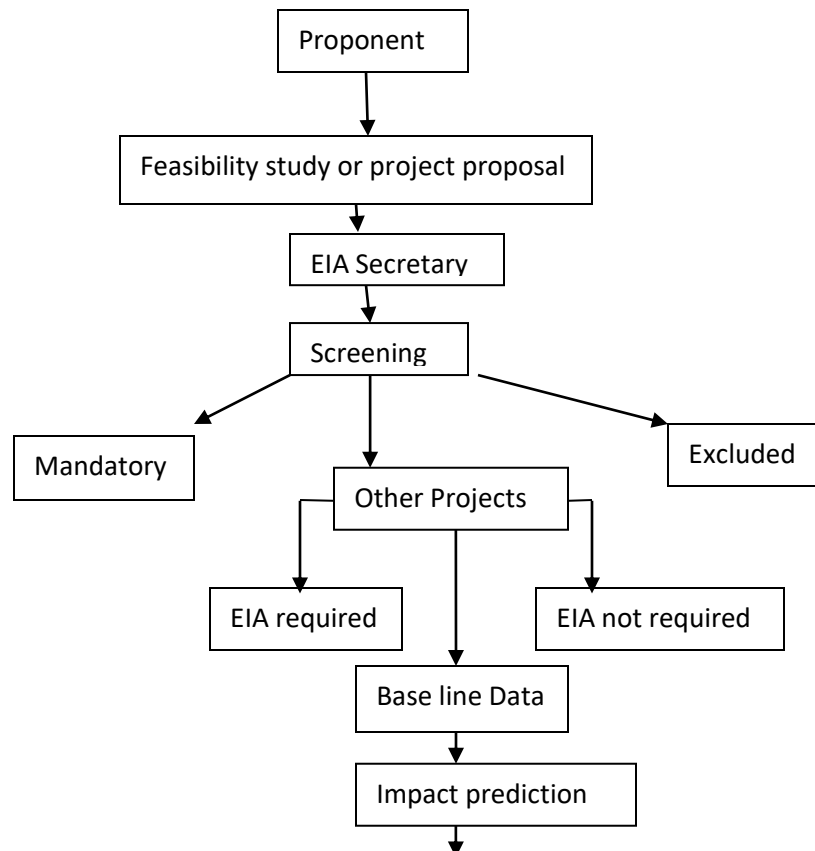
The composition of the Expert Committee for Environment Impact Assessment is as follows

1. Eco system Management

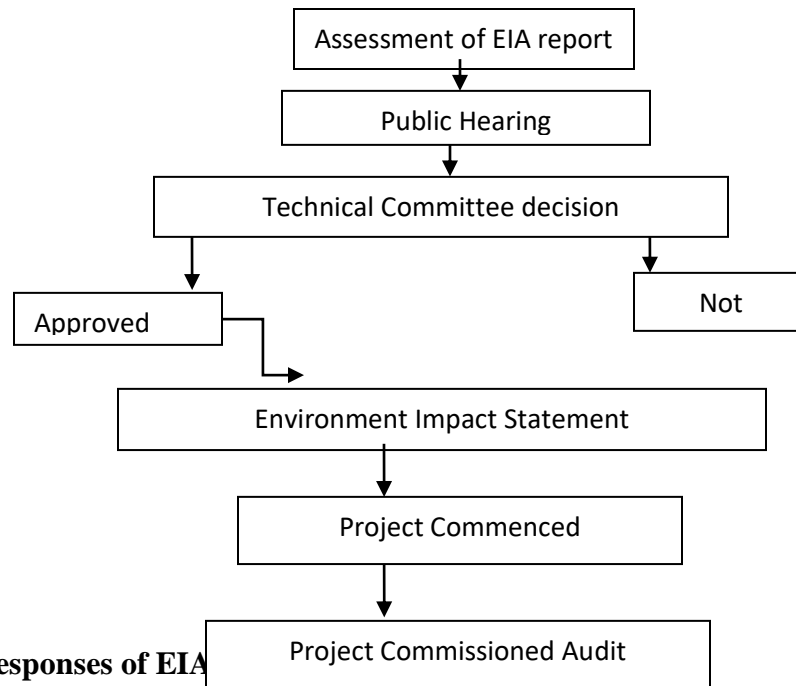
2. Air/Water Pollution Control
3. Water Resource Management
4. Flora/Fauna conservation and management
5. Land Use Planning
6. Social Sciences/Rehabilitation
7. Project Appraisal
8. Ecology
9. Environmental Health
10. Subject Area Specialists
11. Representatives of NGOs/persons concerned with environmental issues.

In this new additions are to be made such as adding the college Principals, Directors of the proposed college, nearby villagers, people who supply articles to the proposed college (tentative), etc.

**Fig 1. General Environmental Impact assessment flow chart**







### 2.3 Challenges and responses of EIA

1. Approach shifting focus from projects proponent to people affected both beneficially and adversely.
2. Adequacy and clarity of EIA scheme.
3. Reliability of information/data.
4. Adequacy of methods for assessing impacts and placing appropriate weight on negative environmental impacts in relation to developmental factors.
5. Resource capabilities.
6. Applicability to all sorts of projects.
7. Fineness of the results produced and the acceptance level of the results.

### 3. Applicability of EIA to small and medium projects

Generic EIA process requires lot of resources including human resources, finance, time to perform the entire task, and also can be done only for large sized projects which are getting reactions from public. But there are certain projects which will affect the environment persistently because of their day to day activities require lot of natural resources, consume energy, create solid waste, affect the nearby land sources permanently, educational institutions

are one among them. This small projects need attention since if we consider the fact of development of a country the small to project ratio is always more and many small to medium level projects are operations are commencing regularly. Also India holds the prestigious position of being an international hub for education; more than 60 country students are considering India for their higher education every year making the educational sector grow to huge levels. Education is being given top priority this days and the literacy rate is rapidly growing, putting India in good position in the global literary rate. Every year more and more students are opting for higher education and about 11,000 educational institutions are presently operating in India in all states. At an average an Indian spends about 20% of his total life span in educational institutions only, making the educational institutions a top priority organization. An educational institute consumes natural resources such as electricity, water, in a scale matching many industries for the day to day activities of the institution. In an average a University supports more than 7000 persons a day including students, staff, visitors and their needs inside the University is fulfilled by consuming resources to large magnitude. Its very twinge to note that almost all educational institutions are constructed, operated without environmental planning, also no legislation specifies the environmental performance of educational institutions. There arises the need for modified EIA to suit the need of these small projects such as educational institutions which when implied will improve the quality of environment a better one.

### **3.1 Suggestions for modification in EIA process**

The conventional EIA process is applicable to huge projects such as dams, road projects, communication works since its time consuming and also there is a need to satisfy public for that project, its cannot be implied directly to smaller projects or operations due to applicability issues. The following modification if done in the holistic EIA process will enhance the applicability of EIA to smaller projects:

#### **3.1.1 Removal of public participation**

The main delay in the EIA process occurs in the public participation and involving public which will suit and also mandatory only to big projects, this can be removed from the EIA process for smaller projects since the whole project involves only limited number of persons and also considering the magnitude of environmental impact this produces smaller impacts.

Also most of the smaller projects will not raise public opposition since it servers to the public in their needs such as constructing educational institutions, thus its suggested to remove public participation.

### **3.1.2 Formation of EIA team**

This is one of the major area where modification is needed, for big projects normally a team comprising of experts from various fields will be involved but it is not necessary in small projects, an EIA team for smaller projects can be formed with the owner of the property who sells the land for the project, managing director of the proposed project, one environmental expert having detailed exposure or various areas of EIA, resource suppliers for the proposed project, one academician if necessary. Any discussion or decision should be made only after consulting all members of this team after prior approval.

### **3.1.3 Preliminary studies to be done**

Unlike generic EIA the initial studies should focus much on the resource usage pattern analysis, land use pattern, material inflow and out flow studies, process control studies, waste generation and disposal pattern. A detailed study is required to analyze the proposed energy usage and water usage pattern; mitigate measures are to be proposed before starting the project. Any study should focus to reduce the resource usage consumption for the full life of the project and a life cycle analysis if possible can also be performed.

### **3.1.4 Timeline of EIA process**

Generic EIA process is time consuming since it involves in depth study, analysis, discussions in various levels and also involves public, but it's not mandatory for smaller level projects, the proposed time schedule for a full EIA is about 20 days to 1 month before commencement of the project. Proper planning and execution should be done while doing EIA to reduce the time consumed in the full process.

### **3.1.5 Environmental performance studies**

It's proposed to study the local area while doing the EIA and also to do a social impact studies near the proposed site, smaller projects will not get more public oppose but its necessary for this projects also. The waste management plan is must for the smaller projects since mostly the waste management plan will not be designed for any smaller projects and almost all wastes are dumped

in nearby sites. All stake holders including nearby site owners are to be consulted since it help will help in later stages of expansion or development.

### 3.1.6 Assessing alternative material usage

The prime importance is to be given to find out the alternate raw material usage both for construction, operation and maintenance of the project. This should focus to convert the project into environmentally friendly and also to optimize the resources, increase the monetary benefit. In regular EIA focus is to be given always to find out the alternate site if there is any problem but in this the thrust is to be given to find alternate materials to be used for the process.

### 3.1.7 Calculation of environmental components

The main components of environment to be calculated in this EIA process includes but not limited to energy usage, type of energy, alternate energy using chances, water usage, limiting water usage in various areas, noise measurement, natural resource usage such as paper and other materials used in the process (Braiassoulis 1989). An environmental matrix can also be arrived and the effect of various components can be found out using it.

### 3.1.8 Social responsibility studies

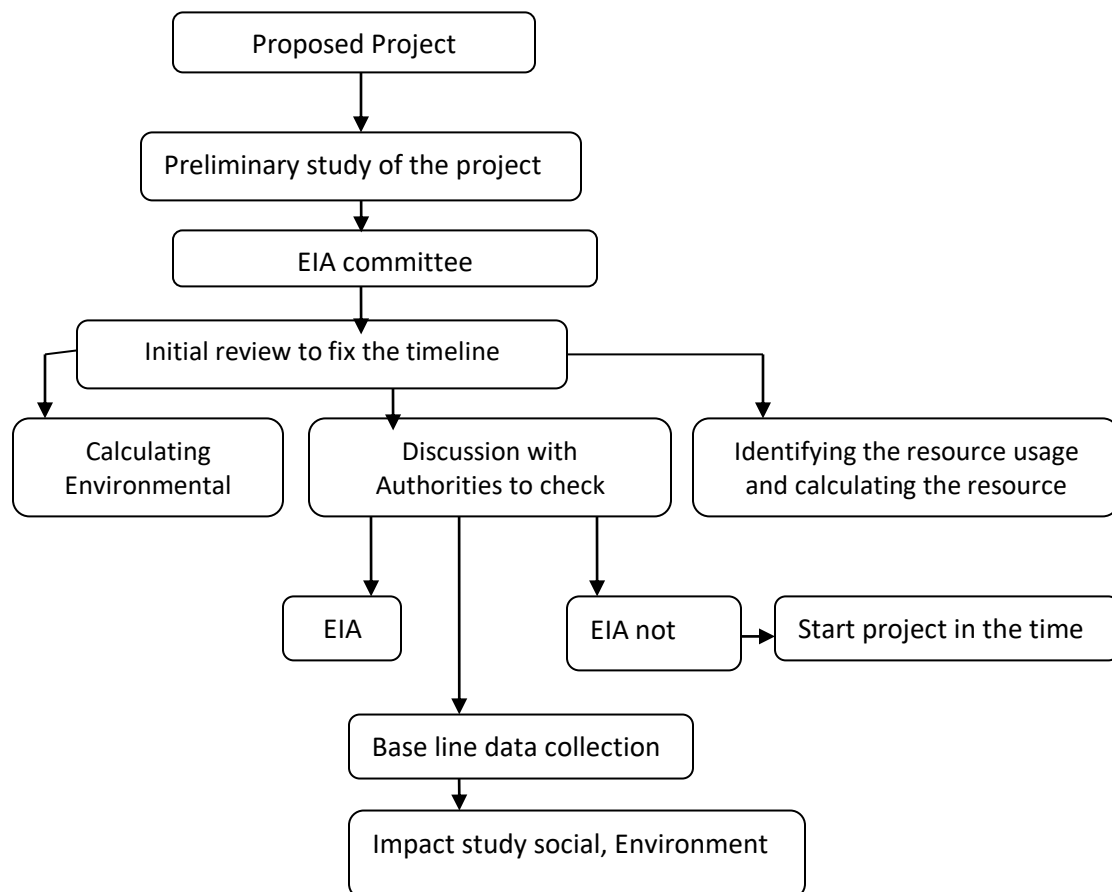
The main aim of the small and medium project in social context is employment to the nearby people, a detailed study should be incorporated in the EIA process to find out the social benefit of the project such as employment, revenue generation, social upliftment, land value modification, impact on environmental ethics and remedial measures should also be suggested if there are any issues in the findings. If the project supports people in the nearby locality to the maximum and with less resource consumption immediate approval should be given in **environmental impact statement (EIS)**. Unlike generic EIA process in modified EIA more importance is to be given to find out the social impact analysis. The detailed flow chart of the various activities to be done in the modified Environmental impact assessment is given in figure 2, which shows the areas where the modifications are to be done to make the EIA process friendly to small and medium level projects also.

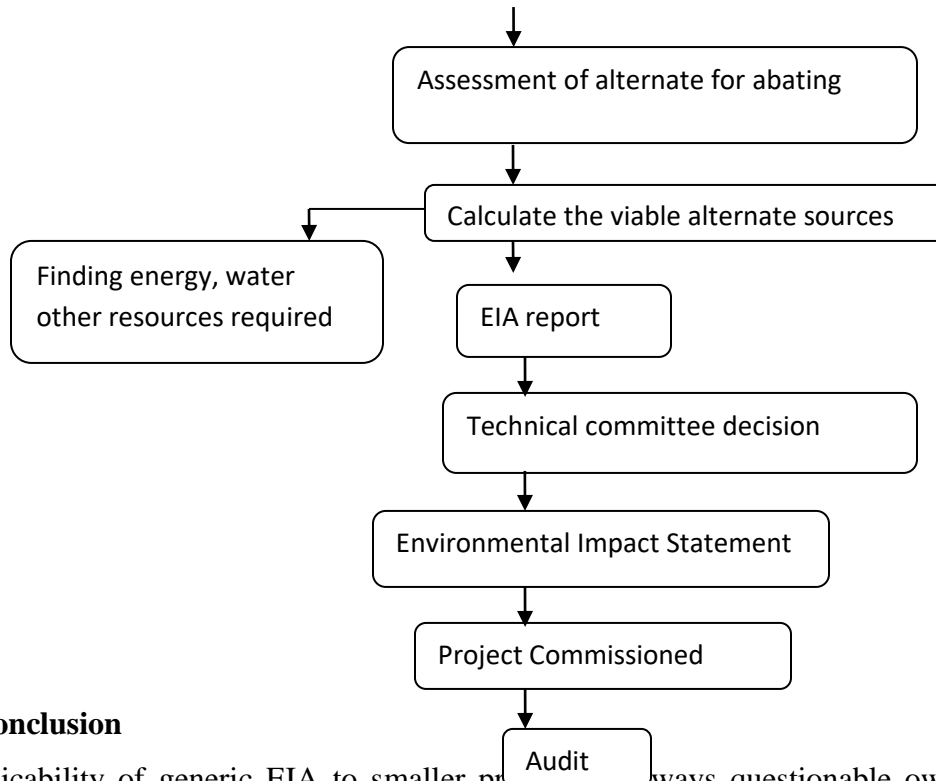
The main details to be collected which are applicable to normal EIA process can also be used which is given below

1. Can the local environment cope with the additional waste and pollution that the project will produce? If not what will be alternate to discharge the wastes? Is there any site nearby?

2. Will the project location conflict with the nearby land use or preclude later developments in surrounding areas? If yes is there any chance of adjusting to the nature of nearby site?
3. Can the project operate safely without serious risk of accidents or long term health hazards?
4. How will the project affect economic activities that are based on natural resources?
5. Is there sufficient infrastructure to support the project? Is there sufficient man power with technical skill to support the project?
6. How much of the resources (such as water, energy etc) will the project consume, and are adequate supplies of these resources available? How much resources the project consume in its life time and also per year, what are all the ways to reduce the same?
7. What are all the measures to impart sustainability to the project? How much beneficial the project is to nearby local peoples?

**Fig 2. Modified Environmental Impact assessment flow chart**





#### 4. Conclusion

Applicability of generic EIA to smaller projects is always questionable owing to the various factors such as reduced time line, cost to benefit ratios, less public opposing, nature of the project etc, but if the effects of few smaller projects on environment is calculated it will be equal to the magnitude of the heavy projects in long term. This days not many smaller projects are forced legally to go for EIA except heavy budget projects (Bhagaven1986) or projects which gets public opposition, it's important for us to modify the process of EIA to suit the need of the smaller projects and to make the public to go for EIA to make the projects sustainable. The modified EIA should focus mainly on identifying the concerned resource usage in particular to that industry and also should study the impact of the resource usage to productivity and utility. Various measures should be suggested to reduce the resource utilization and also to minimize the environmental impacts, various stake holders are to be involved in each and every part of EIA.

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