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ENVIRONMENTAL IMPACTS ASSESSMENT OF INDUSTRIAL ESTATE PROVIDING WITH MANAGERIAL PROCESS

***[1]J. Nouri, [1]A. H. Mahvi, [1]M. Younesian, [2]R. Nabizadeh, [2]I. Hashemi**

[1]Department of Environmental Health Engineering, School of Public Health and Center for Environmental Research, Medical Sciences/University of Tehran, Tehran, Iran

[2]Department of Environmental Health Engineering, School of Public Health, Medical Sciences/University of Tehran, Tehran, Iran

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ABSTRACT

At this study, an environmental impact assessment establishment of Shahzand Industrial Estate in Arak at the central part of Iran was investigated. After collection of data and analysis of the findings, the positive and negative impacts resulted from establishment of the industrial estate were investigated, using the Leopold Matrix and Scaling checklist methods providing the managerial solutions in order to minimize the environmental harmful impacts. The existing environmental situation was investigated and then environmental impact alternatives were determined. This was done regarding to the amount and kind of predicted pollutions for industrial estate at the construction and operational phases. The environmental impact assessment of the investigated estate was studied at the three terms of immediate, direct and indirect impacts at the short, medium and long term. By expanding of Leopold Matrix to four parted matrix, in addition to amount, importance and extend of the impacts, the remaining duration of impact in the environment were assessed as a separate factor in environmental impact assessment. The results of the study with two alternatives, such as; No (performance of the project with no concern for environmental issue) and as yes (performance of the project with application of the environmental harmful impacts) were studied in construction and operation phases. The impact assessment of "NO" property resulted (-1065), therefore the execution of project was rejected, but after reducing the harmful impact performance which were resulted (+1095) has been accepted. Therefore, method of reducing harmful environmental impacts along with environmental management programs introduced and accepted in this study.

Key word: Industrial estates, environmental impact assessment, four parted matrix, managerial trend

INTRODUCTION

"The existence of balance, coordination and required order among natural elements, is one of the key factors in the ecosystem. If this balance is disturbed under certain circumstances, it will damage the structure of living existences and more specifically the human beings. Since a half century ago , factors such as important economical and industrial activities, advance technologies together with growing population and lack of concordance among world's different countries to take optimal advantages of the existing natural resources have disturbed the balance in the ecosystem. As a result, man has caused many problems such as high death tolls and arduous diseases due to the different pollutions in water, air, land, sound, temperature, etc and factors such as erosion, desert, expansion, floods, extinction of plant and animal species, ozone layer destruction, global warming, sea level rise and green house gases increase (Nouri and Neshat, 1984; Canter, 2004).

Environmental Impact Assessment (EIA) is to recognize and assess systematic consequences of projects and programs on elements like physico-chemical, biological, cultural, economical and social phenomena in the environment; in other words it is a way or method to determine the direction or predication and assessment of environmental impacts of activities on the environmental and the

*Corresponding author-Email: *jnouri@tums.ac.ir*
Tel: +98 21 8895 4914, Fax: +98 21 8898 9133

health of ecosystem affecting human lives (Hunt and Catherine, 1995; Masoud, 2005). At the first phase, the process of environmental impact assessment helps to serve a proper programming and stable development and then to found a sound basis for the existing developmental projects. In developmet planning and controlling pollution and maintaining the natural resources and in general to render environmental sound managerial trends (IECCP, 2005).

At present, due to the immethodical development of industries in developing countries including Iran, environmental attitudes to protect the environment and its natural resources for the next generation are of great importance and this has captured the concerning officials' attention. To perform so, in the last two decades, the government has tried to establish industrial estates in different parts of the country to organize the industrial activities and create a sound competitive market and also to control the environmental pollution. The project of establishmeant of industrial estate in Shahzand region with the purpose of organizing industries in the region and creating new job openings or markets to purchase and selling commodities and fostering economical activities and also controlling the pollution resulting from the sporadic industrial activities has received the attention of the local officials (UNEP, 1989). The preliminaries of this project including assessing the project potentialities, local consultation lands ownership located in the south of Shahzand power plant region and in the road of Ghadamga, at a distance of 8 km from Shahzand with an area of 5,059,846 km^2 with surveying are being performed.

MATERIALS AND METHODS

The statistics and gathered data plus maps received from the relevant centers have been the necessary instruments to conduct the present research. The data and required information about surface and groundwater, air, etc. have been gathered from different centers in some cases. The researchers have tried to have sampling and assessment of required variables. The performed studied was conducted in Arak and Shahzand in 2006. To recognize physico-chemical factor, investigation and biological, economical, social and cultural elements are important and essential elements to predict the environmental impacts of the project on the concerning surroundings. To understand and recognize the existing situation of the region, all of the conditions in the environment including physico-chemical, biological, social and cultural factors together with their relevance to the present research have been investigated.

To assess the environmental impacts of Industrial Estate of Shahzand, the method of Leopold matrix along with a descriptive method have been used. By expanding of Leopold matrix to four–parted matrix, in addition to amount, importance and extent of the impacts, the remaining duration of impacts in the environment were assessed as a separate factor in EIA. In this method, score 5 indicates very high positive impact and score 1 indicates little and non important impact; besides, score -5 indicates very high negative impact and -1 indicates very low negative impact (Table 1). Moreover, in this study, extended positive and negative impacts together with their importance were ranged and classified. Score 1 (immediate impacts) represents the impacts affecting the industrial estate, Score 2 represents the region located at the distance of 5 km from the Industrial Estate, and score 3 indicates those region located at the distance of 30 km from the Industrial Estate (Table 2). Furthermore, in this study, to score and assess the duration of the impacts in the environment through approximation for this purpose, according to Table 3, the score 1 indicates short term impacts, the score 2 represents medium term impacts and finally the score 3 indicates long term impacts (Table 3).

Table 1: The class of impacts' amounts with their scores

Positive impacts	Score	Negative impacts	Score
Very high positive impacts	5	Very high negative impact	-5
High positive impacts	4	High negative impact	-4
Medium positive impacts	3	Medium negative impact	-3
Low positive impacts	2	Low negative impact	-2
Very low positive impacts	1	Very low negative impact	-1

Table 2: The class of impacts extents with their scores

The extent of impacts	Score
Impacts affecting the Industrial Estate(immediate impacts)	1
Impacts affecting the regions at the distance of 5 km from the Industrial Estate (direct impacts)	2
Impacts affecting the regions at the distance of 30 km from the Industrial Estate (indirect impacts)	3

Table 3: The classes of duration of impacts with their scores

The duration of impacts	Score
Impacts with short term duration (less than one year)	1
Impacts with medium term duration (1 - 5 years)	2
Impacts with long term duration (more than 5 years)	3

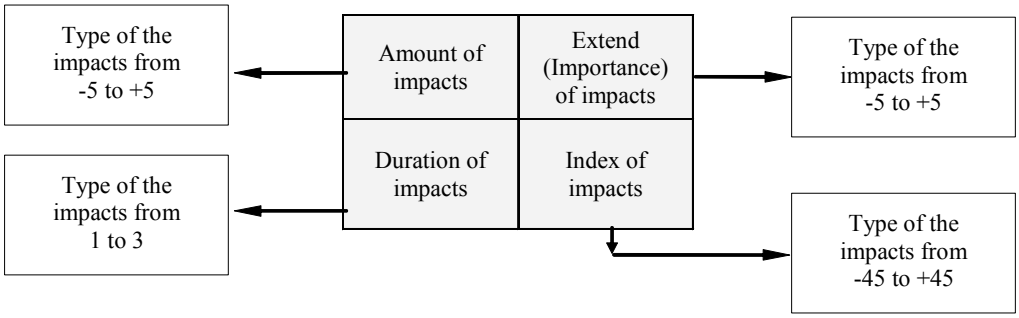

Fig. 1: Plan for quantitative rates of the impacts in the environment

In order to assess the quantitative amounts of the impacts in the environment, plan of the quantitative impacts on the environmental components is illustrated in Fig. 1. As it is indicated in order to assess the quantitative rates of the impacts in the environment's components, the numerical value of three indices of an impact is multiplied by one another and the result of which can vary from +45 to -45 according to the equation 1:

The impact index = Amount of impacts × Duration of impacts × Importance of impacts (1)

The alternatives of assessment:
The alternative"NO" or (rejection of the project performance).
The alternative No (rejection of the performance of the project) was studied and assessed in construction and operational phases of Shahzand Industrial Estate. According to the negative results of the execution of the project with environmental harmful impacts, it was rejected.

The alternatives"Yes" or (acceptance of the project performance)
This was done for Shahzand Industrial Estate at the construction and operational phases with regard to reducing environmental impacts along with environmental management programs and because of the positive results of the project execution it was accepted.

RESULTS

The results of this study are assessed according to the information and data gathered from the region and also the predicted activities at the construction and operational phases and execution of the project there of; then its impacts in the environment were investigated in terms of the amount of the impacts, the duration of the impacts and the attend of the impacts. According to the conducted studies in the mentioned region

regarding the performance of the project and its environmental impacts, the prediction of potential environmental impacts of the execution of Shahzand Industrial Estate project during its construction and operational phases on physico–chemical, biological, economical and social factors in the environment were performed.The assessment of the environmental impacts was conducted, the results of which were (-77) for the alternative "No" at the construction phase and (-988) at operational phase. Furthermore, through reducing harmful environmental impacts and reducing pollutions for the alternative of the performance of the project, the average impacts at the construction and operational phases were 264 and 829, respectively. The results are depicted in Table 4 and Figs. 2 to 4.

Table 4: Results of impacts of the SHAZAND industrial estate for the alternatives No and Yes

Alternative YES (performance of the project)				Alternative NO (non performance of the project)			
Operational phase		Construction phase		Operational phase		Construction phase	
Positive impacts	Negative impacts	Positive impacts	Negative i mpacts	Positive impacts	Negative impacts	Positive impacts	Negative impacts
1798	-969	633	-369	1652	-2640	603	-680
829		264		-988		-77	
+1093				-1065			

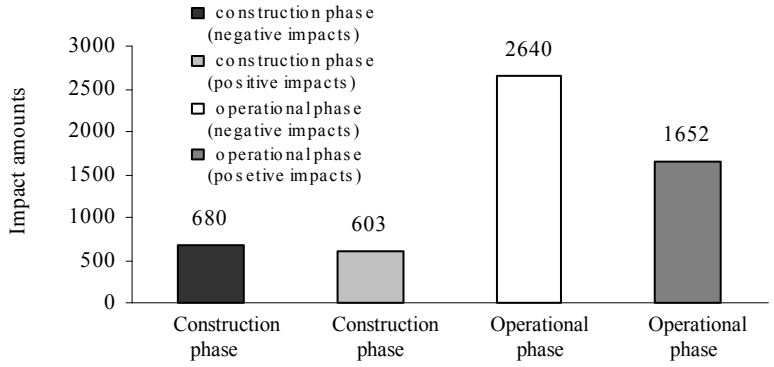

Fig. 2: Impacts of the project for the alternative "NO"

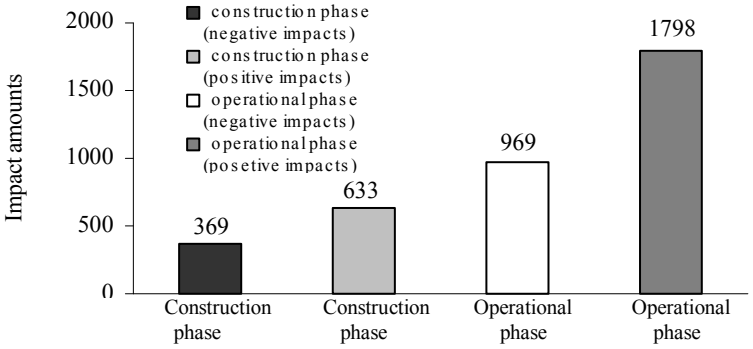

Fig. 2: Impacts of the project for the alternative "YES"

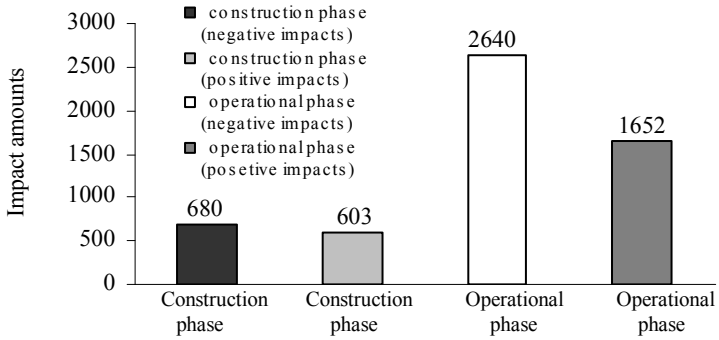

Fig. 4: The total of negative and positive impacts of the project for the alternativ "YES"

DISCUSSION

According to the results and outcomes of the present study concerning the establishment of Shahzand Industrial Estate with regard to the two alternatives (Yes and No), the execution of the project, without the method of minimizing the environmental harmful impacts, will be rejected since the impact assessment of "No" alternative on the environment at the construction phase were (-77) and (-988) at the operational phase. How ever, through the method of reducing the environmental harmful impacts, the results at the construction and operational phases were 264 and 829, respectively, resulting in the performance of the project. Industrial development could be defined as providing the cornerstone for industrial development and social stability with minimizing the environmental harmful impacts. The requirement to achieve such a goal is to merge the environmental considerations with different levels of policy making and administrating levels (Canter, 2004).

The following items, with regard to the conditional of the industrial Estate, are provided as some suggestions for managerial trends:

- To apply the methods of preventing, reducing and controlling the environmental harmful impacts.
- To provide some guidelines for the application of technical methods to reduce the environmental harmful impacts at the construction phase.
- To provide some technical and scientific methods for the proper sewages to prevent the local waters from being polluted.
- To install filtering apparatus in polluting industries to decrease or omit the pollutants.
- To apply technical and scientific methods for the proper removal of waste materials, hygienic and industrial waste waters to prevent from polluting the earth.
- To use modern equipments, scientific methodologies and workers' physical examinations so as to minimize the relevant hazard and reduce sound pollution.
- While activity scientific and technical methods safety procedures and in service training courses for workers to reduce the number of accidents.
- To perform environmental programs and projects by the Department of the Environment to control the environment through continual measuring of the pollutants in different places.

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