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Environmental Impact Assessment and the Sustainable Development of the Oil Refineries in Iran: Assessing Impacts and Possible Solutions

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ABSTRACT

Iran oil industry has developed in current decades. The risks of this development always were considered by the decision-makers. Environmental risk is the process of qualitative analysis of hazard potentials and practical coefficients of the potential risks in the project and sensitivity or vulnerability of the surrounding environment. Hence, besides analyzing various aspects of risk by full knowledge of the local environment, sensitivity of the affected environment as well as the environmental values is applied in risk analysis. Tehran oil refinery was selected as a case study because this oil refinery is in construction and operation phase, so EIA plan can cover all phases of this plant. In Environmental Impact Assessment (EIA) of this study economical, environmental, land use and social parameters were considered in the EIA plan in two phases such as construction and operation of oil refinery during 2008-2012. By using Environmental Risk Assessment (ERA) and Geographic Information System (GIS) methods 512 maps were provided for EIA. Then the maps were overlaid on together final result of EIA maps in four parameters obtained based on the study plan for EIA of oil refineries in Iran. So the decision-making, assessing impacts and possible solutions will available for oil refineries in Iran.

KEYWORDS: Iran oil industry; Tehran oil refinery; Environmental Impact Assessment (EIA); Environmental Risk Assessment (ERA); Geographic Information System (GIS)

1. INTRODUCTION

Upon completion of the phase of identifying the environmental risks, the probable environmental consequences arising from implementation of development project shall be assessed. It means that a qualitative or quantitative conclusion of the identified risks shall be made and the plans for responding to the identified risks shall be judged. There are numerous methods for this purpose. It is worth mentioning that there is no obligation for choosing a method (s) of the environmental risk assessment for the project manager. In other words, neither the employer nor the development project administrator in the concerned organization nor any organization or authority is authorized to make risk management and assessment team choose a specific method from among the common ERA methods. The research team may freely choose a method and this selection is only based on a number of effective parameters. Some of the main parameters and effective factors in choosing the environmental risk assessment method are:

- Research phase of ERA
- Basic available information level
- Ecological sensitivity of the research scope
- Professional workforce of ERA team
- Period allocated to conducting research
- Budget allocated to conducting research
- Type, nature, and specifications of development project

Considering the above specifications, it can be concluded that a technique may be regarded the best in a project and the worst in another. Yet, the following specifications shall be considered in using a proper, optimal method for environmental risk assessment.

- has a systematic approach.
- standardize a considerable amount of information.
- has the potential of making the data quantitative and providing them accurately.

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The environmental risk assessment methods deal with different factors and parameters. However, the reporters and revising group shall ensure that all the environmental parameters, risks, and the consequences of the project activities have been considered. An analyzer and a risk assessor may encounter with piles of information and raw data on the environmental issues for risk assessment. Identifying the proper method of risk assessment may lead to pursuing scientific and operational management of risks besides substantial study of all the identified hazards.

Objectives and Advantages of Environmental Risk Assessment

Of the main objectives of risk assessment process in the environment are:
-Reducing the frequency and severity of accidents
-Minimizing damages to ecosystems
-Supplying safe conditions for the environment (humans, plants, and animals)
-Codifying the relevant rules and regulations
Omission of risks and hazards, identifying methods of the environment protection, codifying safety plans, preparing documents and reducing the environmental damages are among advantages of environmental risk assessment.

Specifications of Proper Risk Assessment

A proper and sufficient risk assessment that can protect the environment and ensure the sustainable development trend shall:
● identify the main ecological and environmental risks.
● identify the probability of occurrence of the hazardous consequences.
● analyze the possible consequences of an event.
● be regarded as the base of judgment for tolerable or intolerable consequences.
● provide some information for making decision and prioritization.
Risk assessment steps shall be reviewed several times in order to make risks acceptable besides reaching a collective agreement by the experts.
The opinion of the beneficiaries shall be considered in all the steps in order to achieve an accurate assessment.

Environmental Risk Performance Assessment

Environmental risk performance assessment studies are used upon applying environmental assessment approach. Environmental risk performance assessment studies aim at study and analysis of the weaknesses and strengths of risk assessment of human and natural systems in comparison with safety and environmental standards, rules, regulations, and requirements. In other words, the environmentalists intend to make an assessment in regard to the function of the development project and how to study and control the identified risks in the preceding phase by this approach. Relying on the results of this assessment, it is revealed that which part of the subject system is sensitive to performance or has a problem since they intend to provide the most useful short-term and long-term solutions through technical, economic, and environmental justifications.

Different steps of research methodology and environmental risk performance assessment studies may include:

1-Study of the data of technical and spatial specifications of the subject site including different products, number of the employed personnel, work shifts, locating installations and different sections of site, developmental measures phasing in the subject phase, etc.;

2-Identifying different types of environmental risk sources in the subject site and reflecting the same by classifying technical, human, and natural risks;

3-Referring to Health, Safety, and Environment (HSE) Division of the development site, if any, and examining the available risks, hazards, and documents by this Division; study of Environmental Impact Statement (EIS) as well as risk assessment of the preceding phase;

4-Designing and completion of special checklists for environmental risks performance analysis through field observations, expertise examinations, face to face interviews with managers, engineers, technicians, etc. in the subject site;

5-Study of qualitative and quantitative status of environmental and human risks in the subject site and its comparison with the similar sites and safety and environmental standards;

6-Comparing occurrence probability, severity and magnitude of each of the subject risks and determining the mean quantity, maximum, minimum, and their standard deviation towards safety and environmental standards;

7-Study of existence or lack of control systems of different risks and hazards in the subject site and clarifying the performance and effective level of each of these systems for environmental risks control;

8-Study of different systems and methods of the similar environmental risk control in the national and international level for performance optimization in the subject site;

9-Comparing different systems and methods of environmental risk control for the subject site from the view of technical, economic, and environmental justifications;

10-Priotorization and choosing the best solutions and prompt, short-term and long-term strategies for environmental risks control and management plan.

Reasons for Risk Management

Overpopulation and human attempts for making a living result in overexploitation of natural resources, increasing raise of destructive, unplanned loadings, and increasing emissions in the environment (water, soil, air, noise) that lead to environmental imbalance. Synergism effect of these factors results in imbalance and low standard of living of humans. Paying attention to this matter shows the importance of environment and its protection.

Considering the foregoing, environmental risk management is of abundant importance and shall be seriously considered by development projects authorities. Generally, environmental risk management is important from the following aspects:

- Minimizing disasters
- Minimizing unexpected problems
- Performing the relevant tasks within the estimated costs and schedules
- Increasing the chance of project success
- Increasing reliability of environment protection

Formulation of Specific Risk Objectives

Explicit managerial objectives shall be formulated before analyzing by the assessment team. Risk managers will promptly determine some objectives. Then try to collect and analyze information. It is to be noted that if objectives are not defined properly, the information may not be useful in decisions made by management.

Accurately revision and modification of objectives will pave the way for achieving more useful result of assessments and analysis. These objectives are:

-Determining the ultimate strategy of risk management

-Risk acceptance criteria

-Continuous improvement

Control of Effective Factors on Risk

-Staff’s performance

-Equipment Status

-External events and challenges

In fact, what always attracts the attention of all experts and officials of oil industries and environmental issues as "the environmental pollution problems", especially oil pollution, now requires more and deeper attention (Daryalal 2002). In today world, there is a huge amount of findings and advances in various aspects of environment to which the conducted researches on environmental impacts assessment shall be added too. Currently, environmental impacts assessment for oil refineries is taking into consideration and improving the natural resources via environmental assessments is seen as the best available method for environment protection (Houshiar, 2001).

The challenge of collecting, processing, analyzing and reporting information can be partially met by the use of various computer and information technologies (computer-assisted systems) (Muthusamy and Ramalingam 2003). In the past the environmental impacts of refineries were given very little attention in developing countries but now they are gradually coming into the focus of attention. And now refineries are considered as those projects with short-term and long-term effects on the environment (Momenzadeh 2006). The goal of this evaluation software model for environmental impacts assessment for oil refineries is to make sure that we are in line with sustainalbe development and that our economic objectives will be followed in a way that the least amount of destruction is done to renewable and non-renewable resources (Monavarie 1999). Therefore, we must see environmental problems from a wide perspective and law makers should create laws to make sure that the development of infrastructures in Iran as well as the economic development be achieved with environmental protection issue being kept in minds (Shariat 2001).

Theoretically, one must investigate the impacts of all possible indices in each EIA. In the future study, detailed data such as waste composition, technology and equipment must be taken into account (Pai et al. 2008). Environmental impacts assessment (the EIA) evolved as a tool to assess the likely impacts, both beneficial and adverse, of a proposed development project (Parashar et al. 1997). A development proposal for which there is concern of adverse impact on the environment should prepare an environmental impact statement (the EIS) for the first-stage of the EIA, and then transfer the EIS to the competent authority for review (Liu & Yu 2009). Life Cycle Assessment (the LCA) allows the estimation of the environmental impacts of a process or product. Those environmental impacts depend on how efficient

these operations are carried out (Lozano et al. 2009). Previous studies have examined the Cumulative impacts assessment efforts at the federal level but little is known about how states assess the cumulative impacts of nonfederal projects (Ma et al. 2009). Due to better environmental practices, water use, and especially the release of contaminants into water resources, as well as air emissions (due to very efficient dust management), are reduced considerably (Mangena & Brent 2006). Refineries produce a lot of solid waste materials (Aghaie,1986). One of the ecological problems of refineries that are in coastal areas is their adverse impacts on marine ecosystems (Bahoush 1991). In different processes of production done in coking and catalyst units' sour water containing phenol, ammonia and hydrocarbons are produced (Golestan, 1985). The main pollutants are sulphur oxide, nitrogen oxide, carbon monoxide, aldehydes, ammonia, particles and hydrocarbons (Jaafarzadeh,2001). Another source of pollution can be releasing water used for cooling purposes, water used for washing purposes, leakage of substances from tanks, pipelines and loading places (Ghanizadeh, 2001). Hydrocarbons emitted from refineries are the main cause of pollution. They are emitted either from chimneys or from reserve tanks. Some hydrocarbon emissions are the result of evaporation (Sarfehnia 1993). The existing EIA system focuses primarily on the treatment of pollutants after their generation, rather than on the prevention of pollutants before they are created, it encourages enterprises to continue their reliance on the EOP treatment (Chen et al. 1999). Finding financial sources, experts and institutional capacities for this will be only one of the helpful tasks (Branis & Christopoulos 2005). The goal of ES development effort is supposed to be a workable system for production use (Ketata et al., 2000). During the prototype begins function satisfactory, the system performance criteria can be defined for developing system (Negnevitsky, 2005). User involvement in design and implementation of expert systems is generally encouraged in the literature, but actual involvement of users in expert systems development is usually ignored (Azadeh et al., 2009). The answers to these questions are used as input to determine the element or factor (Yang et al. 2001). As the project proceeds the ES needs to be periodically tested and evaluated to assure that its performance and results are converging toward established goals. ES testing and validation are vital before their effective employment in the intended user environment; therefore, system validation has received considerable interest among many AI researchers (Er & Dias 2000; Mosqueira & Moret 2000). The adoption of an environmental management system (the EMS) can guarantee several benefits, such as improved environmental performance, reduced liabilities, better compliance, improved public image, reduction of costs and better access to capital, therefore helping the firms to be more effective in achieving environmental goals (Bevilacqua & Braglia 2002). The enforcement of legislations can help in implementing and monitoring the EIA effectively and successfully (Alshuwaikhat 2005). Implementation of the new SEA directives into national legislations will therefore bring (similar to the EIA procedure) a need not only to establish new unplanned monitoring systems (or significantly extend the existing ones) but will prepare and agree on a set of simple (well measurable, internationally comparable) variables, and that is indicators, organize centrally managed and methodologically supported storage and dissemination of relevant information to governmental and nongovernmental bodies including public entities. Finding financial sources, experts and institutional capacities for this will be only one of the helpful tasks (Branis & Christopoulos 2005). The science of risk analysis which has emerged as a major branch of knowledge in recent years to forecast the likelihood of accidents, to assess the consequences of likely accidents, to work out strategies to prevent accidents and also to lessen any adverse impacts in case an accident occurs (Khan & Abbasi 1999). In community-based approaches to the EA, a participatory forum facilitates a process of communal dialogue and collective decision making that includes: the development of goals, the sharing of knowledge, negotiation and compromise, problem-posing and problem solving, the evaluation of needs, the definition of goals; and research and discussion usually around questions of justice and equity (Sinclair et al. 2009). Industrial ecosystem is an important approach for sustainable development. (Singh et al. 2007). The findings from this study and future research will be important as practitioners consider opportunities for implementing environmental review alleviation and varying approaches to integrating planning and environmental review processes (Slotterback 2008). Scoping is a crucial yet less-researched-on stage of environmental impacts assessment, in which practicality falls well behind conceptual ideals. We argue that such implementation deficits reflect dilemmas between two key rationales for scoping—environmental precaution and decision-making efficiency—and between technical and participatory conceptions of the decision-making process (Snell & Cowell 2006). With the use of this study the process of environmental assessments in the country would be done in a more systematic way. Thus this would lead to more effective environmental assessment reports. Recently, many industrial, regulatory, and community leaders have expressed concern that the current environmental regulatory structures disregards multi-dimentional environmental impacts, and that they provide few incentives to develop and use new technologies, and fail to consider site-specific conditions (Elcock et al. 2000). The role of the EIA authority is central to the EIA process and to the permit-granting processes. A developer must take into account all the aspects addressed in the authority's statement (Soderman T., 2006). Through the EIA system, it was hoped to expand the provision of green fields in land development, to minimize topographical changes due to construction, and to allocate additional protected areas in large scale tourist developments (Song & Glasson 2010). In conclusion, the development and application of such a multi-

criteria methodology forms a sound scientific base for an overall and more integrated socio-environmental planning in relation to population, urban structure, green and infrastructure network of shrinking cities (Schetke & Haase 2008). New software package for conducting rapid risk assessment (RRA) in chemical process industries and the system of methodologies on which it is based are described. The objectives behind the development of the package are to achieve greater breadth and depth, sophistication, and user-friendliness in conducting RRA (Khan & Abbasi 1999). Regional environmental risk assessment can be defined as risk assessment which deals with a spatial scale that contains multiple habitats with multiple sources of many stressors affecting multiple endpoints (Xu & Liu 2009). Environmental risk assessment is an essential element in any decision-making process in order to minimize the effects of human activities on the environment (Darbra et al. 2008). Methods for measuring environmental risk and environmental performance, in relation to all types of environmental effect, should be agreed and used in a consistent fashion across the business from strategic considerations to specific projects. Mechanisms for setting goals/targets based on these measures should be made explicit and agreed (Slater & Jones 1999).

Tehran oil refinery

Oil refinery and environment interactions were studied given the size of the job and environmental features in the framework of different units of an oil refinery (executive, constructional, operational and processing) and different environmental (physical, biological, socio-economical and cultural) parameters. The major environmental impacts and consequences of oil refineries include gas emissions, effluents, solid wastes, noise, odor and negative visional and aesthetic impacts (Ardalanie, 1989).

The following are the details of the oil refinery facility of the case study:

Name: Tehran Oil refining Co.

Date of establishment: 1965-1968

Date of operating: 1969 (South refinery)-1973(North refinery)

Nominal capacity: 220,000 barrels per day

Operational capacity: 240,000 barrels per day

Feed: Light crude oil of Ahvaz –Asmari oil field, crude oil of Maroon/Shadgan, Middle Asia

Production units: Crude oil distillation, viscosity control unit, liquid gas recovery, gasoline hydrogenated refining and gasoline conversion, hydrocracker, Hydrogen, Nitrogen, Sulfur recovery, Amine gas treatment (Khosravanie, 2001).

Table 1: Tehran oil refinery productions

Real average of products	Capacity (1000 liter per day) product
Liquid gas	1259
Gasoline	1700
Jet fuel	6989
Light Naphta	383
Kerosene	3442
Gas oil	12872
Furnace oil	7549
Crude engine oil	1878
Bitumen production feed	2160

Source: Iranian petroleum ministry

MATERIAL AND METHODS

Environmental Risk Assessment

Totally ERA based on five stages severity impact, probability impact, importance impact, impact type, significant impact. In each part some items have been considered. These items are the base of evaluation of environmental risk assessment method. Each part discuss of ERA details, terms and conditions. These details give a clear help of user for understanding of steps of decision making base on the ERA. Each subtitle of these five steps describes the effects of construction and operation phases on the environmental parameters by measuring the risks of these effects with the formulas that will come after these tables. These formulas are base calculations of ERA method. By using of these items the result of ERA will be consider in the software for getting results of EIA of oil refinery. Base on the ERA framework and EIA of this project evaluation are these tables.

Table 2: Severity impact

1	**Negligible**	**Tolerable –No significant impact over environment, human and communities**
2	Moderate	Change of behavior, immigration, tiny change of nature, negligible, limited, reversible impacts over humans, animals and social communities
3	Critical	Demolition of ecosystem, limited mortality, limited and reversible undesirable impact, moderate controllable pollution
4	Catastrophic	High mortality, high pollution, sever intoxication, undesirable and irreversible impacts over plants, animals, human and communities, undesirable ,irreversible, highly toxic, intolerable, profound pollution, uncontrollable

Table 3: Probability impact

Rare	**Has not been seen yet, no history of the event**
Seldom	Under emergencies and natural disasters (torrent, typhoon, earthquake, fire)
Occasional	Under unusual circumstances and technical defect of equipments (machines)
Likely	Under periodical and planned conditions
Continuous	Occurs permanently and eternally

Table 4: Importance impact

Short term	**Limited desirable or undesirable impact, short term pollution dissemination, short term operations**
Long term	Limited desirable or undesirable impact, Long term pollution dissemination, long term operations
Reversible	Positive and negative impacts due to operations liable to restoration or correction, tolerable
Irreversible	Positive and negative impacts not due to operations liable to restoration or correction, intolerable
Indirect	Impacts of the operations indirectly affect ecological, economical, social and cultural environment. Derived from operations that are different temporally and spatially from place of consequence or impact occurrence which are nominated as secondary impacts.
Direct	Impacts due to operations directly affect physical and chemical environment. Operations that occur on same time and in the same place and seen as primary impacts.
Cumulative	The impacts that added to the past and present impacts and are not easily traceable. The cumulative impacts are derived from weak impacts accumulating during the time.

Table 5: Impact types

Positive	**Desirable, with appropriate impact over physical, chemical, biological, economical, social and cultural environments.**
Negative	Undesirable, with inappropriate impact over physical, chemical, biological, economical, social and cultural environments, unwanted.
No impact	No change, with no impact over physical, chemical, biological, economical, social and cultural environments.

Table 6: Significant impact

0-3	**Green**	**no impact - low**
4-6	Yellow	minor impact - moderate
7-10	Orange	major impact - high
10>	Red	critical impact - extreme high

Function of this method is on the base of environmental impact assessment matrix and environmental risk assessment that are modified and mixed together to bring the best result of environmental impact assessment of oil refineries.

Geographical information system

For long time, people have studied the world using models such as globes and maps. In the last thirty years, it has become possible to put these models inside computers; more sophisticated models into smaller computers. These computer models, along with the tools for analyzing them, make up a Geographic Information System (GIS) (Ormsby et al., 2004). GIS is a computer system for collecting, checking, analyzing, and integrating information related to the earth surface (Krpo, 2004). This system is able to collect and use data related to different location of earth (Navaie Toranie & Adeli Nia, 2004). In fact GIS helps the managers, programmers, engineers, and everybody implementing data as a type of system for management, analyzing, and show data and results (Saadi Mesgari & Ghods, 2005). Therefore, it is a useful tool for integrating data and information, and assisting in decision-making (Liu et al., 2007) that means the purpose of GIS is to provide an objective support for decision making based on spatial data (Taboada et al., 2006). GIS is a powerful software technology that allows unlimited amount of information to be linked to a geographic location. Coupled with a digital map, GIS allows users to see locations, features, events, and environmental changes with unprecedented clarity. In addition it displays layer upon layer of information such as environmental trends, pesticide use, soil stability, hazardous waste generators, dust source points, migration corridors, Lake Remediation efforts, and at-risk water wells. Effective environmental practice considers the whole spectrum of the environment. GIS is used in the entire world. Use of GIS in Europe started for

registration of properties documents and preparing of environmental data base. In England the biggest user of GIS is services work such as telephone, water, electricity, gas, and preparing the geographical data base. Users usually implement GIS for monitoring and modeling regarding environmental changes such as in Japan and China. In addition nowadays GIS is used in environmental monitoring, environmental pollution, and protection of water resources for the entire world (Navaie Toranie & Adeli Nia, 2004).

In this research GIS-EIA system modified and designed for Environmental Impact Assessment of oil refinery in Iran as Tehran oil refinery has been selected for EIA. In this part of research for two case studies as Tehran oil refinery in four parts of economical, environmental, land use and social items have been considered to provide complete environmental impact assessment results for them. Base on the researches in the part of economical three items have been considered as; workshops, industrial equipments & material shops and economical knowledge. In part of environment; local environmental changes have been considered for better results. In the part of land use; changing the usage of natural resources and use the lands around the oil refinery for site preparation and effect of oil refinery on the land use changing have been considered to complete the land use part in the field of EIA of oil refinery. In the part of social; cultural effects, Environmental knowledge and historical problems have been considered for effects of these oil refineries on the population parameters and results of them in the field of EIA oil refineries. All of these researches based on the EIA Tehran oil refinery in two parts: construction and operation. For each refinery 100 effective maps provided for Tehran refinery in two phases as construction and operation in four general classification as; economical, environmental, land use and social parameters. As specified in each study area, the latitude and longitude of each point of the area was recorded by using a GPS. By using the software Arc GIS 9.3 point data were converted to the regional data. Using the interpolation method, the parameters of the raster maps were prepared. The produced maps were combined together and with respect to the software classification model, different maps were drawn. For better results maps based on geographic location and characteristics of the nature of the information or forms built on land boundaries are identified in the study, were drawn. Also raster for map drawing has been considered as information which distinctive visual elements (multiple layers) are displayed (pixels).

Then for complete the EIA study data integrity done as, data integrity means that using one or multiple databases, multiple tables with multiple layers of information, the information can be viewed on a map. In the next step maps were drawn as, view single physical forms part of the surface which is graphically displayed on a flat surface. Drawings signs, symptoms, and spatial relationships between the forms show. All maps provided with zooming capability in order to view details parts of geographic information big and bigger. For better analysis in EIA-GIS system in the maps data integration has been considered as, data integration means using one or multiple databases and multiple tables and data layer, the information can be seen on a map. In the next phase polygon of the maps for EIA results provided as, a polygon shows that the area on the map and the form of the curve that it can be defined with it.

RESULT AND DISCUSSION

The results for GIS-EIA Tehran oil refinery

Obviously, the implementation of GIS in any organization is its complexity. As studied in this project for Tehran oil refinery the successful result of study is coming for final action plan of GIS-EIA. However, for the successful implementation of a system for GIS-EIA, the following actions should be taken as follow;

-Requirements Analysis of EIA oil refinery.

-Implementation of a pilot project (Pilot) for more accurate identification of needs and problems, in this case Tehran oil refinery.

-Conceptual design, logical and physical database.

-Maps, drawings and specifications needed to produce guidelines.

-Produce a map and descriptive information collection requirements.

-Design and implementation of GIS-EIA of oil refinery.

-Providing hardware and software requirements, and training of personnel.

-Development of the database is designed to cover specific applications for the system.

-Application development and data analysis functions.

-Development of information exchange standards and processes

-Development the GIS-EIA and the development and maintenance of information processing of EIA.

-Full implementation of GIS-EIA as integrated systems in other operational units and dependent organizations same as workshops, material shops and personnel.

-Full implementation of GIS-EIA as Environmental and Social Action Plan (ESAP) as effects of oil refineries in social parameters same as; historical, environmental knowledge, cultural problems.

-Development of GIS-EIA as land use parameters and its effects on population and environment.

-Design and implementation of GIS-EIA as economical parameters such as workshops, material industrial equipments & material shops.

-Development of GIS-EIA as environmental parameters base on the lab tests and their effects on the located area on the maps.

In this project GIS-EIA of Tehran oil refinery and effects on located areas around it (Azim abad, Bagher city, Dorsoun abad, Esmaeil abad-e-moein) different parameters (economical, environmental, land use and social) have been considered to provide the maps based on data collections, expert system decision-makers and GIS information. All these areas pointed on the maps and sat-images of their area on the GIS-EIA study of each oil refinery.

Table 7: Different parameters maps of Tehran oil refinery and located area around it during the project implementation (2008-2012)

Location	Parameters			
	Economical	Environmental	Land use	Social
Azim abad	36	28	28	36
Bagher city	36	28	28	36
Dorsoun abad	36	28	28	36
Esmaeil abad-e-moein	36	28	28	36
	144	112	112	144
Total maps	512			

All maps designed and implementation of four parts of GIS-EIA of oil refineries as case studies, Tehran oil refinery. Total maps of this project are 1024 maps for two case studies in four years by developing of four parameters effects on their locations.

Table 8: Different kinds of GIS maps provided for each case study during the project implementation-Tehran oil refinery (2008-2012)

Special Geographical GIS maps	Numbers of maps of Tehran oil refinery			
	Azim abad	Bagher city	Dorsoun abad	Esmaeil abad-e-moein
Hill shade	16	16	16	16
Layers	16	16	16	16
Land use	16	16	16	16
Sat-image	16	16	16	16
Slope	16	16	16	16
Tin	16	16	16	16
Zoning	16	16	16	16
Total maps	112	112	112	112

The criteria used to determine the score and weight maps for each of the criteria and sub-criteria classification in Expert choice 11 the achieved weight in preparation software. After the raster with Raster calculator in Arc GIS 9.3 they have been overlapped. Figure 1 Map of weighting factors for each of the above shows. Figure 2 to 5 Final plans zoning EIA-Tehran oil refinery as digital displays for construction phase and figure 6 final plans zoning EIA-Tehran oil refinery as digital displays for operation phase. The map of the objectives are in the study and use of software EIA and effective points in the region with four exciting classification, low, moderate, high, extremely high.

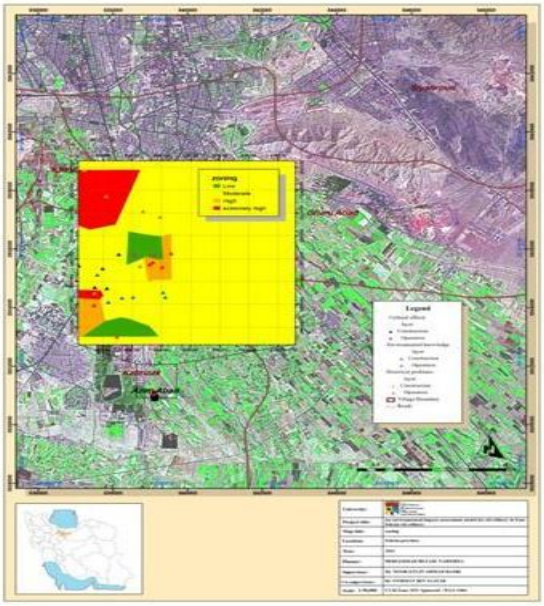

Figure 1: Land use parameter (2008-2012)

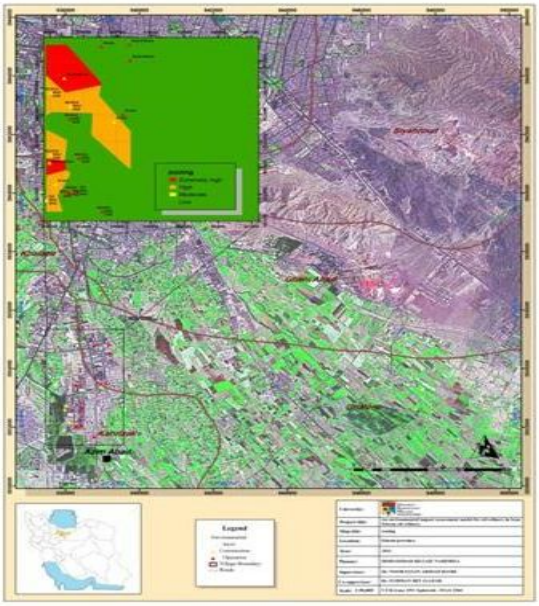

Figure 3: Social parameter (2008-2012)

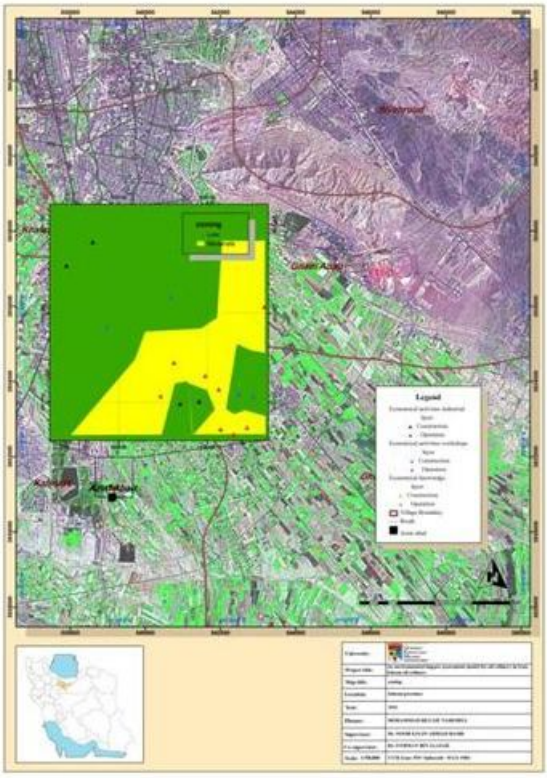

Figure 2: Economical parameter (2008-2012)

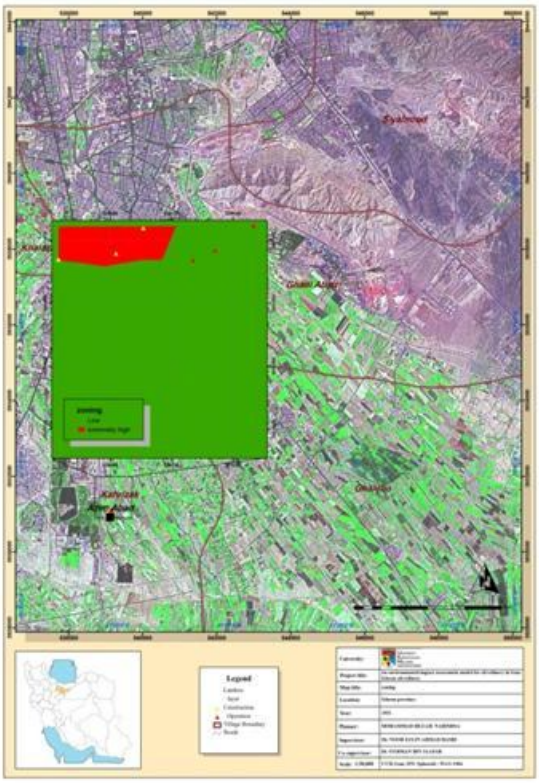

Figure 4: Environmental parameter (2008-2012)

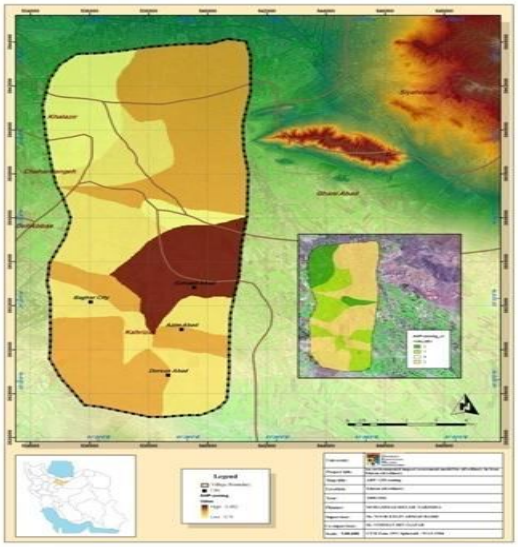

Figure 5: EIA Tehran oil refinery final weightings map in construction phase during (2008-2012)

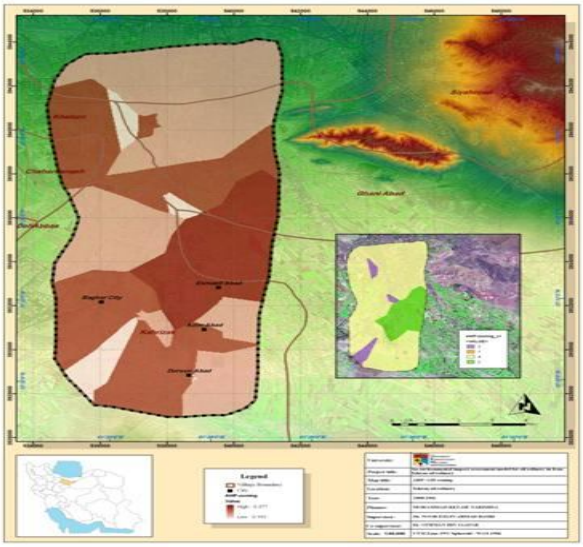

Figure 6: EIA Tehran oil refinery final weightings map in operation phase during (2008-2012)

Conclusion

Environmental Protection in Oil refinery in Iran

In the seventies in Iran, particularly in the final years of the decade, negative consequences of the environmental destruction and pollution were obvious. This work is aimed at correcting the attitudes of policy makers with regard to the environment. Sustainable development means development with minimal negative consequences on the environment. In this context, the Environmental Protection Council Act requires companies to provide a environmental assessment report when doing their feasibility studies and during their site selection. Considering the harmful effects and sometimes irrecoverable and costly consequences of many development projects, environmental assessments as a powerful tool for achieving sustainable development gained legal attention in 2004 in Iran. In fact, environmental impact assessment is the study of environmental effects on all environmental, economic and social aspects. Undoubtedly, development of industrial facilities has various negative impacts on the environment and people. Often these problems are not related to the development or technologies themselves, but they are related to environmental problems that follow. Due to the attraction of Tehran's ecosystem the city has been focusing on widespread use of land, water when developing. Because the premature development without environmental evaluations can have undesirable effects on the environment and the welfare of human beings, it is dependent on doing environment impacts assessment through using technology and by taking into consideration the inter-relationship between development and environment conservation. This way we can achieve a sustainable development. In the past few decades we realized that it is not desirable to be only focused on economic or social development without taking into account the environment protection issues. Hence the concept of sustainable development and environmental impacts assessments were introduced to have a balance between industrial advancement and environmental protection and environmental impacts assessment of oil refineries and its related land preparation tools of sustainable development plans came into consideration. If site selection for oil refineries can be based on ecological, social and economic needs, oil refinery projects will run with less environmental costs. When considering environmental aspects in the planning process to develop oil refineries operations environmental assessment mechanisms that are environmentally compatible should be used to make sure we are in line with sustainable development guidelines. Environmental issues inconsistent with the country's development environment are concerned. Cultural differences, organizational structure, political priorities and the type of environmental issues in their causes required changes in technology planning and environmental management act.

Acknowledgment

The aim of this study is to evaluate effects of the implementation of Tehran's oil refinery on the environment region. It is based on similar projects and specialized technical resources to identify environmental factors that were exploited in fine project activities. The evaluation used in environmental impacts resulted from project implementation and methods and simple checklist Leopold matrix interaction and environmental impacts assessment. According to studies completed and results evaluated in a two phase matrix, construction and operation

were observed in the project with no negative effects. So plans with the destructive or very destructive effects of lower than 50 percent applied to construction improvement will be approved plans. Finally, methods were developed for reducing and controlling the negative effects and consequences of structural parameters and providing utilization and monitoring programs and environmental management.

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