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Environmental Impact Assessment and Increased Risk Of Among People Living Near the Oil Refineries in Iran A Case Study Tehran Oil Refinery

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ABSTRACT

According to environmental regulations construction and operation of oil refineries require the Environmental Impact Assessment (EIA) studies. Therefore, first tried with a library and field studies, actual knowledge will be achieved about the whereabouts of the project to identify all the activities of the two phases of construction and operation. Finally, the two methods of environmental risk assessment and Geographic Information System (GIS) are selected to perform the EIA. These methods have been considered to evaluation approach to Tehran oil refinery decision making for final EIA of oil refineries in Iran as sample. The Environmental Impact Assessment and risk problems of oil refineries in Iran is based on the evaluation of environmental and social impacts reports are based on the field studies, environmental assessments social parameters as cultural, historical and environmental knowledge. Then decision-making process will give the final results of EIA and risk problems of living people among the oil refineries in Iran in this case Tehran oil refinery. In final process of EIA for case study 512 maps were provided and final maps for four years between 2008 to2011 EIA and risk studies in two phases as construction and operation. Then all layers collected and put on together to provide final EIA and risk of living people around oil Tehran refinery map of the case study as a sample for all oil refineries in Iran.
KEYWORDS: Iran; Environmental Impact Assessment (EIA); Risk; Tehran oil refinery; Geographic Information System (GIS).

1. INTRODUCTION

Sustainable development depended on taking care of the earth. Earth has its own limitations; these limitations mean technologies cannot be extended indefinitely. To live within these limitations and to ensure that the scarce facilities in the near future would be available, any exploitation of nature should be after resource evaluation within the power and capacity of the environment. We should make sure that the above rules and criteria are met when environmental projects are being done. The aim is prediction, identification of probable problems and detailed analyses about the impacts of the projects on the environment. Generally, oil industries can cause differing degrees of quantitative and qualitative impacts on the environment. In many countries in recent decades, researchers, environmental tools and techniques used to help related staffs have been utilized to identify an appropriate way of oil industry development plan with the least amount of negative impacts on the environment. This research is about rules, guidelines and standards about environmental performances and actions. In current urban population growth and rapid development special attention should be given to the environment in urban areas and oil industry related installations. Solving environmental issues are relatives to improving conditions in the environment management system and using new methods and develop environmental impacts assessment regulations and standards related to it. Governments in the Islamic states should provide for executive, legislative and judicial apparatus that are in line with the Sharia laws to make sure that functions such as production, distribution and consumption are done properly. One of the main tasks of a government is to protect the environment and to provide ways to utilize renewable sources so that next generations can also benefit from those kinds of resources that are not renewable. The second task on the shoulders of government is to make sure that privately owned usable sources be used in a way that does not have negative impacts on the environment. Governments should provide for policies and legislations that strike a balance between development plans and environment protections in a way that both maximize the productivity of societies and the establishment of justice. Utilizing the fundamental principles and objectives of Islam for economic

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systems, governments should make sure a healthy environment for the present generation and next generation would be maintained. Description of consequences of a potential hazard with its probability of occurrence is called risk. In other words, probability of occurrence of damages arising from a hazard is called risk. According to the above definitions, it can be concluded that risk is combination of probability of occurrence of an event and its consequences. Risk is generally perceived based on imagination of people who face it. While some people consider a definite activity with a rather lower risk, some other may consider it as a great risk in the same condition. This judgment is based on their experience or error and may highly depend on psychological, social, cultural, and political factors in the past, present, and future. This fact shall be always considered when evaluating a risk that we need a risk assessment structure. Risk perception may be correct or incorrect based on the given information. It is the product of probability of occurrence of environmental hazards in the intensity of loss and damages on living communities (humans, animals, plants) and/or non-living environments (water, soil, air, etc.). Study of human risks and the related studies is a part of risk management and focuses on risk assessment such as social, cultural, and health risks in human societies. The subject environment in assessment of human risk includes societies and places where manpower is gathered that is threatened by natural phenomena. Different factors may generally bring in hazards for different parts of the environment. Environmental hazards with physical source include factors from different forms of energy; for example, noise pollution, mechanical transfers, ionizing and non-ionizing radiations, heat stress, etc. Chemical hazards comprise such factors as gas, vapors, toxins, etc. Although these factors carry energy, their material nature is considered. However, physical hazards are energy that causes damage to human and environment. Biological hazards refer to all pathogenic microorganisms in the environment. Environmental risk assessment includes identifying the affected environment, time modeling, spatial modeling, dissemination, assessment of the main ecological elements taking environmental sensitivities into account, risk quantity estimation in comparison with the existing criteria and identifying measures for risk reduction. The development and implementation of a three-stage EIA process involving: (1) preliminary screening of proposed undertakings; (2) environmental assessment of those proposed developments deemed to have potentially significant effects during the initial screening stage; and (3) environmental impacts review in those circumstances in which large-scale public consultation and detailed technical reviews are required to determine impacts and project suitabilities (Armitage 2005). The concept of defensive expenditures could be used to assess social responses to adverse changes in environmental and resource conditions, as a means to distinguish stages in which local sectors respond individually from qualitatively different stages in which intersectoral events are more noticeable (Escofet & Bravo-Pena 2007). Generally speaking, decision-making divides broadly into three levels: policy, plan/program, and project. The EIA was supposed to be a tool for both preventing damage to the environment and the early integration of environmental considerations into decision-making (Feldmann 1998). The increasing awareness of the findings of policy and decision making theory in the environmental assessment community has recently led to an intensifying debate on the theoretical foundations and the appropriate practical use of strategic environmental assessment (the SEA) (Fischer T.B., 2003). This means that the future Environmental Impacts Assessment (the EIA) procedures applied to each specific road and railway project in this infrastructure plan, in the areas indicated as 'critical' in the screening, have a high probability of obtaining a negative EIA declaration from the independent environmental bodies, which will compromise the legal feasibility of these particular projects (García-Montero et al. 2010). However, in order to assess the global impact of these plans, the SEA must analyze other aspects related to the future use of the infrastructure network, including the overall impact on energy resources, contamination and climate, changes in demographic distribution, and the alteration of the socio-economic balance of the territory under question (Garcia-Montero et al. 2008). The potentials of environmental assessment as a sustainability instrument has long been recognized, but the criteria against which the development proposals traditionally are judged are not necessarily the criteria for sustainable development (George 1999). Moreover, the EIA system under the EU Directive is undergoing review by the European Community, and there may well be some major amendments to the directive as a result of this review. These different factors will make the next 10 years of the EIA practice in Ireland not only interesting but very challenging (Geraghty 1996). Environmental impacts assessment and strategic environmental assessments are essential instruments used in physical planning to address such problems (Gontier et al. 2006). Furthermore, it would be beneficial to carry out research on what kinds of buildings are assessed, and compare the quality of assessed buildings to the existing building stock (Haapio & Viitaniemi 2008). Traditionally, environmental problems have been most focused at large point sources, e.g. industrial plants, power plants, mining areas etc (Hanssen 1998). 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). 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). The results of an EIA can help an organization to diagnose the occurrence and seriousness of various environmental impacts that may determine its performance (Pun et al. 2003). The EIA research agenda must evolve and mature if this globally significant decision tool is to fulfill its potentials (Cashmore 2004). The ideas reflected in the proposed model also forms the basis for the assessment criteria consolidated in a Review Protocol and an Evaluation Package which can be used as a tool and a benchmark for assessing the practice of incorporating the RA into the EIAs of high profile projects (Demidova & Cherp 2005). Such learning may conceivably prove to be of equal significance as environmental assessment's more direct contributions to transforming development plans (Cashmore et al. 2008). The reason for examining documents other than just the EIS was to get a better picture of the EIA process as a whole, rather than just what was reported in the EIS (Cooper & Sheate 2002). These methods usually display extensive databases and fragile qualification instruments to support stakeholders' decisions (De Siqueira & De Mello 2006). In recent years, the above-said department under the new name of "the Deputy Office for Human Environment" has been re-established. This department is in charge of executing supervisory regulations related to environmental impacts assessments of plans and projects (Dabirie 1994). Boilers and turbines also release particles that are directly proportionate to the quality of fuels used (Roshanzamir 1991). 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). This is an aspect of both impacts assessment and effectiveness evaluation theory that is critically under-developed (Cashmore et al.2010). Environmental assessments (the EAs) refer to preliminary studies conducted within the environmental impacts assessment (the EIA) process in the United States; such studies are used to determine the significance of anticipated impacts of proposed actions (Burris R. K., & Canter L. W., 1997). Environmental impact assessments (the EIA) are considered as important tools for the assessment of the impacts of human activities (Cartalis et al. 2000). Seen this way the IA is primarily used to gather knowledge that supports the outcomes of the continuous negotiations of the Commission's proposals (Backlund 2009). Environmental impacts assessment can be defined as the process of predicting and evaluating the effects of an action or series of actions on the environment (Baratto et al. 2005). Natural resources are in general considered the ''inputs'' to impacts assessment studies (Bare & Gloria 2008). The Guidelines include a standardized approach to evaluating social impacts that might occur throughout the 4-phase life cycle of a typical industrial or dangerous facility, including: (1) planning/policy development, (2) construction implementation, (3) operation/maintenance, and (4) decommissioning/abandonment (Bass 1998). Human activity has an inevitable impact on the environment and this impact is generally negative. It is unquestionable that society is increasingly aware of the state of the surrounding environment, since it forms the basis for all human activities (Blanco Moron et al. 2009). Process industries involve handling of hazardous substances which on release may potentially cause catastrophic consequences in terms of assets lost, human fatalities or injuries and loss of public confidence in the company (Kalantarnia et al. 2010). Hydrocarbons are among the most important air pollutants that are emitted by petroleum refineries, since they are involved in almost every refinery process (Kalabokas et al. 2001). Environmental impacts assessment (the EIA) is a procedure for assessing the environmental implication of a decision to enact legislation, to implement policies and plans, or to initiate development projects. It has become a widely accepted tool for environmental management (Ramanathan 2001). This would increase the weight of the EIA related arguments in the national appellate procedures and contribute, in some cases significantly, to the substantive influence of the EIA in decision-making (Polonen 2006). The association of the EIA with other environmental management tools, such as environmental management systems or environmental performance evaluation, and sustainable development initiatives will be a priority challenge for all who are engaged in this

domain (Ramos et al. 2008). Looking to experience in planning, then, might help in providing insights into some of the conceptual problems faced in environmental assessments (Richardson 2005). Once the objectives are set, there should be a systematic screening of options – on purely environmental factors in the EIA process involving land use planning, where wetlands were threatened by settlement sprawl, for example (Ruddy & Hilty 2008). This constitutes the evaluation process that involves the aggregation of the individual assessments to a total assessment on the basis of a logical decision or process. (Sankoh 1996a). African countries and the majority of developing countries in the world have not been able to adopt or have never considered adopting a formal EIA (Sankoh 1996b). These limiting indicators can then be used to define exploitation limitations and carrying capacity constraints to define economic development strategies that are environmentally sustainable and economically viable (Schultink G., 2000). 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).

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 EIA with RISK and GIS of 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.

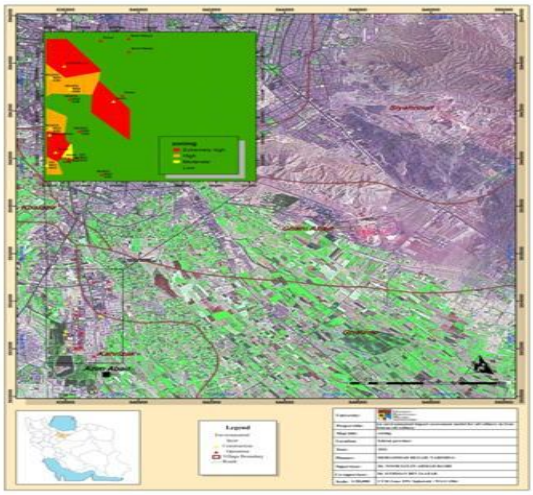

Figure 1: Environmental parameter (2008-2011)

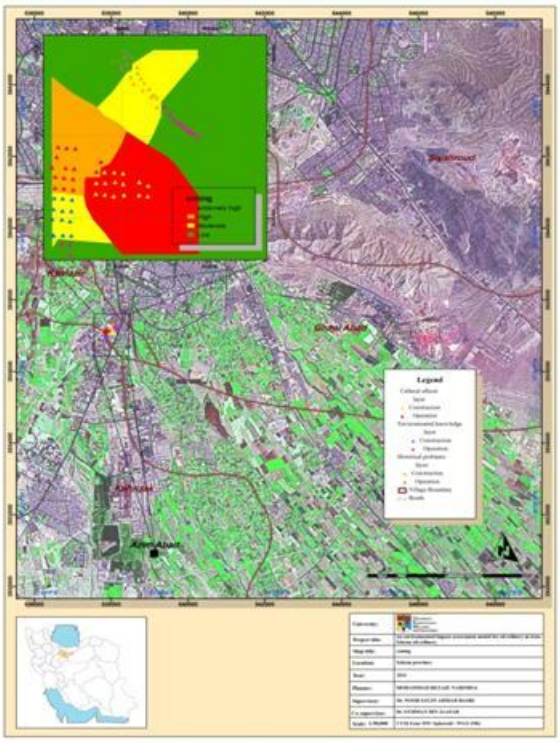

Figure 2: Social parameter (2008-2011)

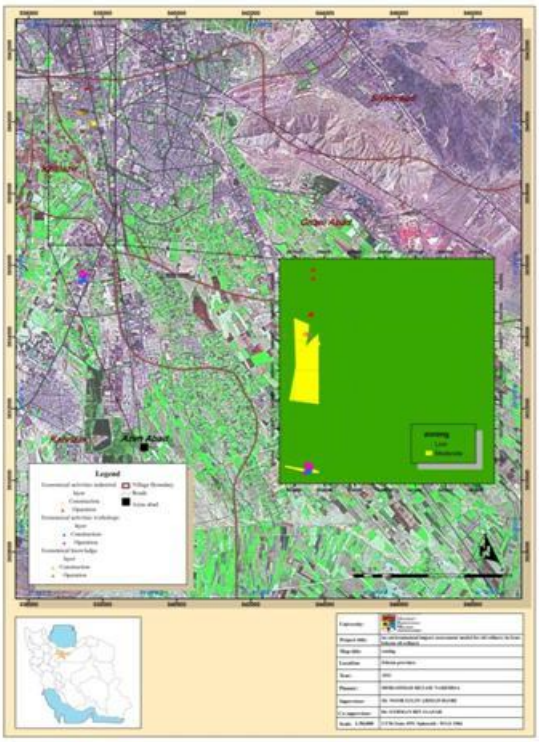

Figure 4: Economical parameter (2008-2011)

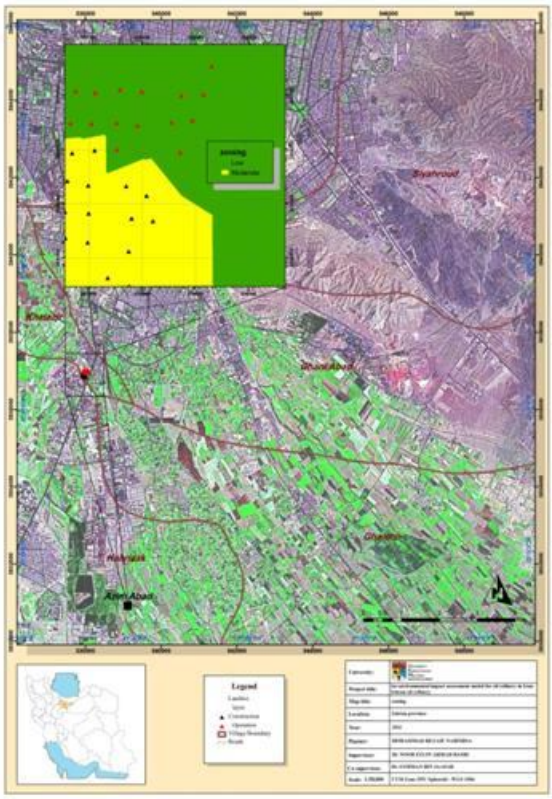

Figure 3: Land use parameter (2008-2011)

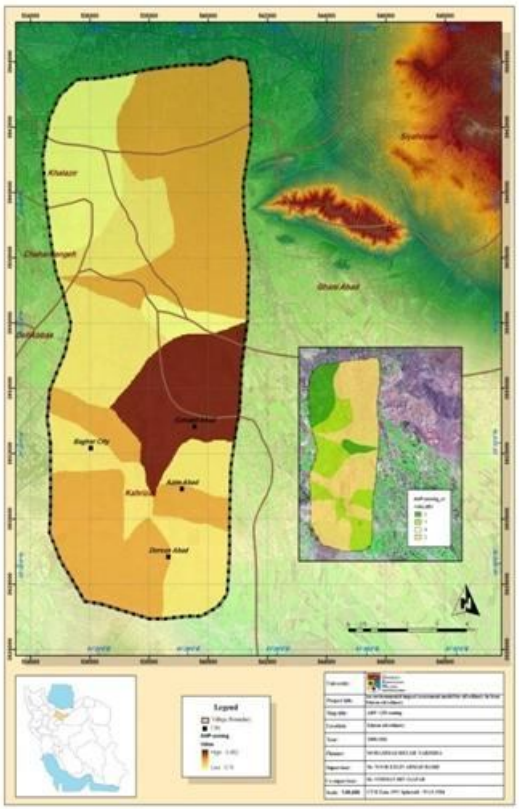

Figure 5: EIA Tehran oil refinery final weightings map in construction phase during (2008-2011)

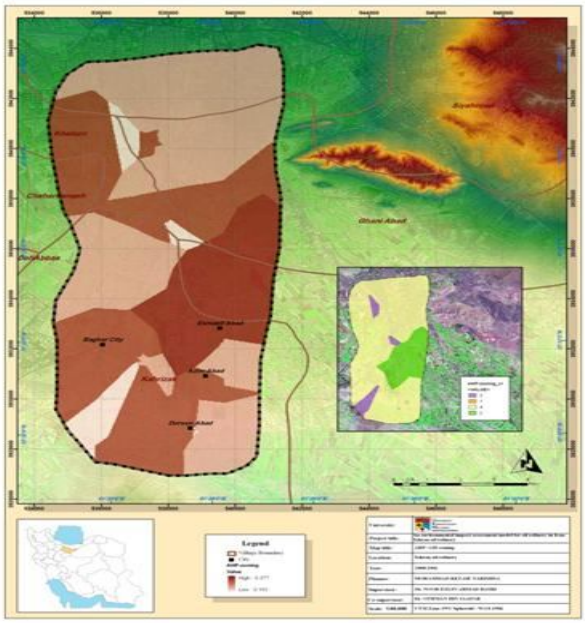

Figure 6: EIA Tehran oil refinery final weightings map in operation phase during (2008-2011)

Conclusion

Environmental Protection in Petroleum Industry especially for oil refinery

After identifying all the technical, environmental, social and economic factors of the projects, different options to take into consideration when carrying out the projects are assessed in order to remove the worries of the society and to lessen the adverse impacts as far as possible. One the main option that has to be assessed is the "No Option" or "Not-carrying-out-the-project Option". In this option, it would be made clear that what the environmental state of the area would be like if the project is not carried out. The result of this option would serve as the basis for comparison or a yardstick for the projects or plans. (It shows the differences between when the project is carried out and when it is not carried out). In this phase, the main aim is to provide a basis for acceptance or rejection of options. Therefore, here we should take into consideration not only the environmental issues, but also the economical issues should be taken into account, such as how long it would take for the plan to start making profits. Other issues to be dealt with are whether the project is in line with social or cultural features of the area, and whether the assessments for the costs to improve the ways the environment can be utilized are done and are well known. In selecting options issues such as "the ratio of costs-profits", "public acceptability of the project", or "advantages versus costs" should be considered. In case no option is regarded as not being 100% safe or free-of-damage, the issues to be dealt with would be ways to reduce possible damages to the environment. And if there are other options to reduce the amount of damages imposed on the environment that are not mentioned as parts of projects or plans' activities, that option or options should be considered as a separate independent option to be included in the report. Options are assessed in different classifications and divisions, these are as follows:

- Basic options

-Whether it is necessary to build a new refinery, at all?

-Whether part of the transportation services should be done in other ways?

- Options with regard to site selection of the projects

-Where should the new refinery be built?

- Development option

-What is the best route for the transportation of the products?

-Whether the expansion of an already-existing refinery has priority over the construction of a new one?

-In exploiting the new refinery what is the more proper technology?

- Non-physical options

- Is it essential to make a change in transportation plans of the manufactured products to reduce air pollution?

Site selection, materials transportation, and the process options are the main options for construction and directing refineries considering the above cases.

Acknowledgment

The probability expand of each outcome is intensify and expand of an outcome. For example oil content form oil refinery can make an environmental pollution as oil pollution. If the intensify effects of the oil pollution on environmental parameters considered individually (example: only effect on soil), it may be considered insignificant and small. But if several environmental parameters have been considered together, it can be considered significant and large scale (example: soil, land use, social index, economical index). During determination the intensify of each outcome, measurement of transfer and expand of these effects (from activity area) should be considered. Reduction in agricultural production due to oil spill on the environment around the oil refinery plant, cane be happen miles away from the oil refinery and its negative effects can be remain in the environment for months or even years after oil spill and other side effects on population.

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