

**Introduction:** With increasing attention about environmental issues, especially in the recent century, and some problems like population growth, poverty, natural resources exhaustion, and widespread pollution it is needed to form an environmental management system. Environment is a complicated combination of various factors which is appeared from evolution of organisms and component of the earth. Thus, it affects human activities and also affected by them. Connection between human and environment result in organizations and communications that require a program compatible with the environment.

Ardakan Pelletizing Plant with 3.4 ton capacity of production per year and 780 hectare area is located in 32° 22' North latitude and 53° 47' East longitude, 25th Kilometers of Naeeen, Yazd, Iran. Raw materials that are iron ore concentrates are produced from Chadormalu iron ore. Then, iron ore concentrates are changed into pellet during a process. Through this method pellet can be reclaimed and changed into steel. The area is not suitable for agriculture and is just suitable for industrial activities. Job positions here prevent migration of local people to big cities. Gas emissions from chimnies cause pollutions including Sox, NOx and dust. Fortunately, the area has potential of refinement.

**Materials and methods:** This study aims to investigate environmental impacts of the industrial activities. Thus, some methods can be used in this survey. These methods are case study, questionnaire, interviewing, internet searching, and library studies. For data analysis, some software such as SPSS 17, GIS 9.3 and Excel were used.

Questionnaires with up to 33 questions were designed to gather the required data. Statistical population of this research is the managers and experts of the plant and central office (55 persons). For determining sample size, simple random sampling and Cochran formula was used. Finally, sample size was estimated about 42 persons. In the next step, to make a ranking of pollutants in the questionnaire, TOPSIS method was applied. TOPSIS method, as a multi criteria decision making method, is our main technique that is employed in this research. Since this method is designed based upon intellectual deductions of specialists, our model would lead to more realistic results. This method includes 6 steps. Its basic concept is that the best selected alternative from a finite set of alternatives should have the shortest distance from the ideal solution and the most distance from the negative ideal solution in a geometrical sense. Thus, contaminative alternatives and criteria of functional procedures are categorized by means of a TOPSIS method.

**Results:** Environmental management plan is suggested to evaluate and monitor all of the impacts resulted from the activities in the plant. This plan can cause coordination and conformity between all factors of environment system. Environmental management includes many methods and policies to improve condition of the environment. This action makes reduction in the environmental impacts and promotion of quality level for environmental parameters. Moreover, it is necessary to monitor and control changes of quantity and quality of environmental parameters according to standards.

Results indicate that among air pollutants Electrostatic Precipitator (with importance of 0.817), among water pollutants lab (with importance of 0.971), among noise pollutants Roller Mill and in soil contaminants function of pan conveyor and rotation of rolls in Rollers (with importance of 0.988 and 1) have the highest priority. In habitats and vegetation, wastes and for socio-cultural and economical environment, residential villages both with importance of 1 got the highest rank. Furthermore, harmful environmental factors and occupational accidents respectively with importance of 0.542, 0.993 obtained the highest priority among health and industrial safety criteria. According to these results, establishing environmental management plan is a good suggestion to assess, monitor, and survey the impacts of Ardakan Pelletizing Plant activities on the environment. In this plan location of sampling, kinds of pollutant emissions, measure indicators, and time frequency of sampling were determined. Execution of this plan helps mitigate harmful environmental impacts. Moreover, corrective actions lead to better reduction and control.

Below table (Table 1) shows a monitoring plan in both constructional and operational phases. Parameters that are monitored include particles, SOx, NOx, CO, and noise. Moreover, sampling points in

constructional phase include the areas where produce pollutants like soil operations. Persons in charge of monitoring are Environment Experts or HSE inspectors with cooperation of reliable observers. Moreover, some of management solutions for controlling environmental impacts are mentioned here. In production process, pollutants are in 2 forms of gas and particles. In steel industry storing and removing of materials and raw material productions are the main factor for air pollution and wind help them to spread more. Moreover, in result of bag filters operation, particles are emitted into the air. Another unit that makes air pollution is gravity collector. Wet scrubbers in mixing, cooling and screening can also be a cause for air pollution.

These are some of methods for controlling particles dispersion: planting trees, using ceiling fans in workplace for aerification of air and reduction of particles, using stores for controlling dust dispersion, using waste gases for producing heat and steam, using electrostatic filters for dust refinement, cleaning units and manufactory with vacuum cleaner, sealing doors and windows of control room to prevent dust penetration, allocating %25 of plant area to vegetation, using central bag filters to reduce dust of fusion chimney.

For reducing noise in the plant these ways are suggested: using the fans and engines with lower noise, installation of silencers in input air system of compressors, lubrication of equipment with grease and oils, tightening of pieces and equipment, reduction of time of noise confrontation among persons, using suitable foundation, noise insulation equipment, protection hats to prevent noise transferring, vibration control, and health and safety education to employees to care about their hearing.

In production cycle of Ardakan Pelletizing Plant there is not any waste in that the plant has waste reclamation system. This system follows a direction that all of the waste and under size and over size productions are mixed with water and conducted to clarifier in the form of slurry. After water refinement, the precipitated materials by slurry pump go into thikner and after another precipitation and filtering operation go back to cycle production. The waste water from irrigation and raining in the form of runoff enter into some canals arranged in all of the plant. The canal ways at the end are connected to evaporation pound. Base of this pound is covered with plastic as an isolator. Thus, there isn't any leakage to lower levels and the pollutants can't leak to the nature. The evaporation takes place from the top of the pound.

Some solutions for reduction of water pollutions are: using water waste for irrigation of plants in yard of the factory, construction of a pond for sedimentation of iron oxide, construction of waste water treatment system to prevent mixing sewage with other sources of water, and washing of filters based on standards. For waste management some solutions are also suggested: reduction of waste from the source of production, separation of waste, refinery and recycling, prevention of mixing hazard wastes with other wastes, and storing all of the wastes in one place for sale.

For reducing energy consumption these solutions are proposed: optimization of fuel consumption, identifying the areas of energy dissipation, increasing the resources for promotion of energy management, identifying potentials of energy economy, identifying points of energy loss, reducing energy consumption in chimney.

Solutions for reduction of health impacts in place of work are: application of masks with filters for employees, using of dust filter for chimney, using sprinkler to moist and reduce dust, use of noise isolation with doghouses in chimney, and using protective caps to prevent transfer of the noise.

In conclusion, this can be argued that as this plant is built 5 years ago, application of modern technologies such as online monitoring systems and filters for controlling air pollution can put it in a desirable condition.

Keywords: air pollution, Ardakan Pelletizing Plant, environmental impact, Multi Criteria Decision Making Methods (MCDM), TOPSIS Method