Proceedings of Iran International Aluminum Conference (IIAC2014)
May 25-26, 2014, Tehran, I.R. Iran

Selection of suitable site for constructing coke plant by AHP and ranking method.

Sara Khosravi*, Mohammad Aghajanlou**

*Petroleum coke expert, IMIDRO, Tehran, Iran
**Petroleum coke executive manager, IMIDRO, Tehran, Iran

Abstract : Coke is a solid and refractory that remains from coal tar, residual oil and other carbon materials after carbonization practice. With advances in metallurgy industry and finishing coking industry, characteristics of coke to produce anode electrode changed dramatically and today petroleum coke has been become the primary material of industry. The major uses of petroleum coke industry is in the aluminium and the steel industry. Selection of a suitable location for the construction of the coke plant affects from various factors which these factors have different aspects such as environmental, technical and economical. Various factors may overlap or conflict with each other. Among the important factors for choosing an appropriate location is being closed to the source material, feed capacity and assigning it to the coking unit, feed quality, proximity to markets and domestic consumption and … . Because the most important raw material for petroleum coke is residual oil obtained from refineries, so the most basic parameter in the site selection for construction of coke plant is locating near the refinery.

To select location for construction of the coke plant, managing these parameters is very effective that the plan have the economic and technical justification. On the other hand, in order to establish priority places on base of Iranian refineries, many properties should be studied. Multi-criteria decision making provides this possibility that different places be prioritized, according to multiple criteria and characteristics. Variability of multiple criteria is one of problems in using multi-criteria decision making. Thus, using a software application programming based algorithms by a suitable method is necessary.

In this paper places, priority for construction site selection of a coke plant has been examined by using two methods of AHP multiple criteria decision making and Ranking implemented in Matlab software. Thus management of any number of place can be prioritized by regarding each criteria to be classified as managers and professionals priorities.

Keywords : Site selection, prioritizing management, AHP, Ranking, Matlab.

Introduction

Selecting Suitable site for constructing Petroleum Coke Plant depend on some factors that include: proximity to sources of raw materials, feed capacity and allocating to the coking unit, feed quality, being closed to the internal market (single calcinations, the aluminium industry, Refineries and Petrochemical), being closed to sea, rail and airport, construction site industrial experience, suitable infrastructures, environmental impact, cost of land, skilled labour forces, proximity to target countries, and export status of the industry in terms of being strategic. Currently, domestic demand is supplied by imports of petroleum coke. Raw material for the production of petroleum coke is residual oil obtained by vacuum distillation towers in refineries and quality of the feed. In addition to the cases mentioned in site selection for production of petroleum coke is a function of other factors such as environmental aspects of these factors, that are economic and technical. Factors aspects may overlap or conflict with each other. In a significant number of cases, allowing the allocation of feed needed for the construction of a refinery in delayed coking unit does not exist, therefore the desired unit is removed from the list of options. The main factors are discussed in the following words.

Effective Parameters at priority ranking and selection of Site location of Petroleum Coke Plant

Being near the sources of raw materials

Proximity to sources of raw materials in the transmission of faster and cheaper raw material is very effective, especially in industries that consume large amounts of material in a day. Besides the construction of the coking unit according to the type of feed, proximity to oil refineries is very important. Refineries of the country such as the oil refineries in Abadan, Tehran, Isfahan, Shiraz, Tabriz, Kermanshah, Lavan Island, Bandarabbas, Imam Khomeini (shazand) are options that can be selected to construct a coking unit.

Feed capacity and allocating it to the coking unit

An important criterion in the feed selection of coking process is possibility of feed allocation. According to a conducted study almost a third feed of coking process convert to coke. Therefore, the feed production capacity amounts allocated by each processing unit and the feed of

* Corresponding author: Tel./Fax: +98 21 84812027.
E-mail address: sara.khosravi.ds@gmail.com

coking process can have a significant impact on feed choice that shares may be used for coking. According to data from the Office of Integrated Planning of Refining and Distribution Company of Iran as the reference allocation refinery feedstocks in Table 1 and the Call of Refining and Distribution Company, the only part of the residual of refineries of Abadan, Isfahan, Bandarabbas and the allocation of petroleum in these shares may be used for coking. Due to the low value residual of Shiraz refinery plant with a production of 15 thousand barrels per day cannot be appropriate. Other hand refineries in Tehran, Tabriz, Isfahan and Bandarabbas have viscosity reduction units through which these units can produce significant amounts of residual feed evaporator units, reducing the viscosity of heavy oil molecules break down and become part of the production therefore the production of fuel oil in the refinery will be reduced. The condition of two consecutive thermal cracking is not recommended to upgrade the quality is not economical. However, a significant amount of Bandar Abbas and Isfahan residual continue for production of fuel oil.

Although in some cases, viscosity decreasing units have been used for increasing feed of refineries as distillation unit that from economical view is not in optimum situations of refining operations and will cause increasing of fuel oil production. But this system of operation of refinery units cannot be basis of comparing for defining priorities of refineries in feed procurement of coking unit. Albeit this type of operation is not stable and definitely viscosity decreasing units will be used in their principal duties. On this basis feed procurement for coking unit from residual of distillation in vacuum in refineries of Tabriz, Tehran, Isfahan will cause decreasing existing feed for viscosity decreasing units. Regarding that viscosity decreasing units from view of transferring heavy materials to lighter materials is so much similar to coking units. Therefore some of benefits of transferring fuel oil to lighter materials is accessible now and without enterprising for construction coking unit.

Table 1 amount of production, existing assignment of possible refinery feeds in m3/day.

Feed capacity and assignment to coking unit	Abadan	Isfahan	Shiraz	Bandarabbas	Tehran	Tabriz
Feed capacity	20000	4000	4800	40800	32000	14400
Assignment to coking unit	4700	5500	250	4340	0	0

Source: Integrated planning office of oil refinery and distribution Co.

Feed Quality

The main factor in determining the properties of coke production is quality of feed. So that in most coking units that produce anode coke, sulphur and metals content of the feed is low, this subject due to the low amount of impurities in the crude oil refinery inputs. However when considering massive cuts process for refining petroleum coke product quality can be improved. By analysis of refinery vacuum tower residual of Iranian refineries the amount of Conradson, Carbon-Residue, Asphaltene, Asphaltene/CCR, Aromatics, Vanadium (V), and Nickel (Ni) have been identifies. The rivals have been identified by these information.

Proximity to domestic consumer market

Proximity to consumer market results reducing cost and time of transferring product to consumers, On this basis proximity to domestic consumer market for constructing plant of producing Petroleum Coke has been reviewed.

Proximity to domestic markets of petroleum coke production plan will depend on factors that include:

- ♣ Calcinations unit
- ♣ Aluminum industry
- ♣ Petrochemical
- ♣ Capacity by refinery byproducts
- ♣ Production of Graphite Electrodes

Being closed to the calcinations unit.

One of the main steps in the production process and quality coke for use in the production of aluminum anode quality coke calcinations stage is raw or green coke production. Attention to issues related to storage and transport of raw coke, near a food supply of the calcinations process can be effective in reducing costs.

The main advantage can be mentioned about Abadan refinery is its proximity to a private calcinations company of petroleum coke called calcinations of green coke of Khorramshahr. By the visit from the company, the final stages of construction of the plant is in progress and will be operational by the end of Year 2014. Being closed to the calcinations unit in the country, resulting in preference this refinery to other refineries for feedstock supply unit is coking.

Being near the aluminum plants

Due to the high consumption of petroleum coke in aluminum production units being closed to one of the units in these areas will benefit from construction projects. Two aluminum producer plants of Iran located near Arak and Bandar Abbas, are the two foci of this country in petroleum coke consuming.

Being near the petrochemical industries

During producing coke processing of petroleum coke also liquid and gas products are produced. The rate of production is dependent on the type of feedstock and efficiency of process of coking. Since the heaviest cutting oil is used as feedstock of coking. Therefore constructing coking unit caused decreasing production of refinery and increasing production of lighter fuel oil. The rate and type of this change depends on quality of crude consumed by refinery and type of processes that are used in series of coking units or refinery to provide proper feed and treatment sections of coking unit.

It is noteworthy that coking products in the absence of processing in anyway also can be sold at lower prices (however have higher prices than residual) and it can be considered in economic study of construction of coking, so being closed to the petrochemical industries is in

required priority. Regarding to this point that near the oil refineries in Abadan, Isfahan, Arak and Tabriz there are petrochemical plants so constructing petroleum coke plant near these refineries is in priority than other refineries in Iran.

Capacity admission of lateral products

During producing coke processing of petroleum coke also liquid and gas products are produced. The rate of production is dependent on the type of feedstock and efficiency of process of coking. The rate and type of this change depends on quality of crude consumed by refinery and type of processes that are used in series of coking units or refinery to provide proper feed and treatment sections of coking unit.

If produced naphtha in coking used in production of motor gasoline used, some amount of motor gasoline can be produced. Usually, manufactured light and heavy gas oil send for performing more hydrocracking to hydrocracker or FCC unit. Heavy gas oil produced from Coke has boiling range of TBP from 233 to 538 ° C. This product is suitable for feed crop for jacket Crocker unites (catalytic cracking) or isomax that can further increase the production of gasoline and middle distillates. Light gas oil of Coking unite with ASTM D86 boiling point range of 177 to 358 ° C, which is close to the gas produced by catalytic cracking and after processing with hydrogen can be used. In general, it can be a major influence of coking unit in the refinery model in reducing fuel oil and increasing middle distillate materials and gasoline.

Noticing to effect of coking unit on changing production pattern in a refinery that causes reducing amount of fuel oil and increasing light products in refinery and regarding to increasing need of light products that home refineries cannot produce them and by producing fuel oil in a range more than internal need, creating coking unit in each of Iranian refineries can have effective help in correcting the production pattern of refinery in line with being accordant to amount and process of consumption. By this view and from aspect of internal consumption of oil products, priority of location of coking unit for internal refinery are Abadan and Bandaabbas refinery that most of their produced fuel oil export while now fuel oil produced in other refineries uses in country.

Table 2 score of Iranian refineries about proximity to internal consuming market.

Proximity to internal consuming market	Abadan	Isfahan	Shiraz	Bandarabbas	Tehran	Tabriz
Calcinations unit	100	0	0	0	0	0
Petrochemical Inds.	100	100	0	100	0	100
Capacity admission of lateral products	100	100	100	100	100	100
Aluminium Inds.	0	0	0	100	0	0
Graphite electrode production unit	40	80	50	50	50	20

It is noteworthy that coking products even without preparing are in all time sellable with lower price (above the price of residual) and this can be noticed in economical study of constructing coking unit. Moreover providing lateral services needed for coking unit is noticeable. Also providing lateral services is possible by using separate packages and by paying the cost of them. Table 2 presents the priority of Iranian refineries for construction coking unit from point of view of proximity to internal consuming market.

Proximity to target countries for export

Middle east area and specially Persian Golf is one of main areas of world aluminium production by program of production of 6 million ton per year that is potential market for petroleum coke and specially green coke production. Table 3 show the amount of aluminium production in MENA countries and the countries around Iran.

Table 3 Amount of aluminium production and Petroleum coke consumption in MENA countries and the countries around Iran.

Country	Aluminium production (1000 ton)	Petroleum coke (1000 ton)
UAE	1840	759.7
Iran	457	188.7
Bahrain	900	371.6
Qatar	585	241.5
Oman	360	148.6
Saudi Arabia	740	305.5
Egypt	320	132.1
Azerbaijan	50	206.4
Kazakhstan	250	103.2
Tajikistan	450	185.8
Turkey	65	26.8
SUM	6017	2670.1

Source: World Aluminium website.

As it is clear in table 3, Petroleum coke consumption in MENA countries and the countries around Iran is around 2670.1 that by considering the capacity of 2012 for delayed Coker units in Middle East area can produce 2070000 ton of petroleum coke, therefore there is a 600000 ton gap in this area. Thus there is possibility of exporting to this area by constructing a petroleum coke plant in Iran. Table 4 shows the delayed Coker units in Middle East area and also projections of these units until 2020 on basis of SRI report.

Table 4 Delayed Coker units in Middle East area

Middle East		Actual (1000 barel/day)								Forecast	
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2020
Kuwait	Mina Abdollah	72	72	72	72	72	72	72	72	72	72
Saudi Arabia	Al Jubail								100	100	100
Syria	Hams	18	18	18	18	18	18	18	18	18	18
Egypt	Alexandria	23	23	23	26	30	30	30	30	30	30
	Ataqua	16	16	61	16	16	16	16	16	16	16
	Total Egypt	39	39	39	42	46	46	46	46	46	46
Total		129	129	129	132	136	136	136	236	236	236

Source: SRI (Stanford Research Institute)

Table 5 shows aluminium production in our region and also petroleum coke consumption in the world and its perspective in Middle East at 2020 on basis of a report by Roskill.

Table 5 Aluminium production in our region and also petroleum coke consumption in the world and its perspective in Middle East at 2020 on basis of a report by Roskill

Year	Aluminium production (mil ton)	Petroleum coke (mil ton)
World at 2012	44	18.17
World at 2016	52	21.47
Middle East at 2020	10	4.13

As it is clear in tables 4 and 5, petroleum coke consumption on basis projections by Roskill at 2020 will be 4.13 million ton per year that on basis SRI report in this year the amount of petroleum coke in our region will be 3590. Therefore there will be a 423 000 ton gap at 2020 on basis these projections that by constructing coking unit, exporting in this area will be possible. On this basis oil refineries located near the borders and near sea has more possibility for export therefore constructing coking units near Abadan and Bandarabbas oil refineries have more priority related to the other Iranian refineries and thus after these two refineries Tabriz oil refinery has next priority.

Proximity to sea, railway and airport

Accessibility to transportation facilities such as railway and airport can also be considered as another factor effective on financial attraction and helping in communication and decreasing the cost of production. Being closed to the sea and the possibility of using ports can also be considered as another factor. While being close to the sea can help in importing some of need of coking unit feed or importing more pure feed and mixing it with coke with less impurities produced in specific situations and the need to be effective, it can facilitate the export of coke to major consumer has been resulted in the Persian Gulf area. Accordingly refineries in Abadan and Bandarabbas is in such circumstances. If it is needed to transfer the products of process of coking with tansport system therefore the rail transport can be considered as the first choice. Due to the proximity of factories producing aluminium in Iran to rail lines, the production process needs to be implemented easily using rail lines can be transferred to the place of final consumption. Most of the country's refineries (other than Kermanshah, low capacity, and do not produce vacuum residual) definitely have this advantage. Proximity to the airport and also using airport could be used as one of the factors to be considered. In certain cases product transported by air may be required to be done. Most of these refineries have these facilities.

Existing of Skilled labour

Accessing to appropriate human resources can provide facilities for creating an industrial unit and decreasing side costs. Skilled human labour or human resource is one of important factors accelerating the economical development in every country and this factor have much importance in countries that their economical growth is on basis of knowledge-oriented economic. Knowing role of human resource specially skilled human resource and its qualitative and quantitative changes is an essential and important issue for accelerating industrial development in Iran. On this basis big Iranian cities with considerable population and high level universities have better priority related to the other cities.

According to the latest Census of Population and Housing in 1390 , Khuzestan province with a population of 4,531,720 and a population density of 71 persons per square kilometre, contains 6.03 % (total population in 1390 was 75,149,669 person) of the total population of the country. From this number 2286209 persons (50.5 %) were male and 2,245,511 (49.5 %) were women. Also Hormozgan province with a population of 1,578,183 person and a population density of 22 persons per square kilometre contains 2.1 % of the total population of the country. From this number 802,758 person (51%) were male and 775,425 persons (49%) were women.

In figure 1 country population density on the number of persons per square kilometre can be seen that the bar between Khuzestan and Tehran Provinces have the highest population densities in the country and the most populous cities in the country such as Ahvaz , Isfahan, Arak, Qom, Tehran, Karaj, Qazvin, Rasht, … are on this demographic and economic line or in its margins. This line is the shortest route connecting the north and south of the country.

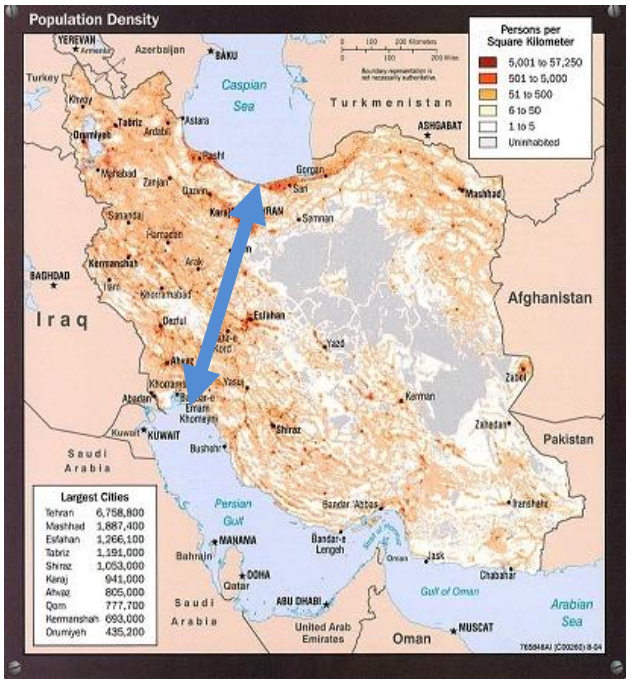

Figure 1 Map of Iran population density.

Defining needful flowchart for using each of Ranking and AHP methods

AHP method

Review process of hieratical analysis or AHP is one of decision making methods that starts by selection of criteria in first section and then on basis of defined criteria, rivals are evaluated. The reason of naming this method as AHP is that firstly we must start from goals and strategies on pick of pyramid and by developing them know the criteria until we reach to the bottom of the pyramid. Decision making about priority of importance each of rivals related to the other and noticing to criteria selected by selectors has been nominated AHP. At each stage of project process that we need to give priority to some rivals or decision making for selection from them is

our duty, AHP tool should be used. Different cases of decision making of continuum and no continuum environment are one criteria and multi criteria with quantitative and qualitative criteria that also in prioritization and decision making about matter of this evaluation we are counteracting with case of multi criteria decision making.

In multi criteria problems, AHP is used in 3 stages: reviewing hieratical of existing rivals, defining relational weight and absolute weight, and reviewing accordance of system. For this method an algorithm has been created (Figure 2) and the related program has been written on its basis.

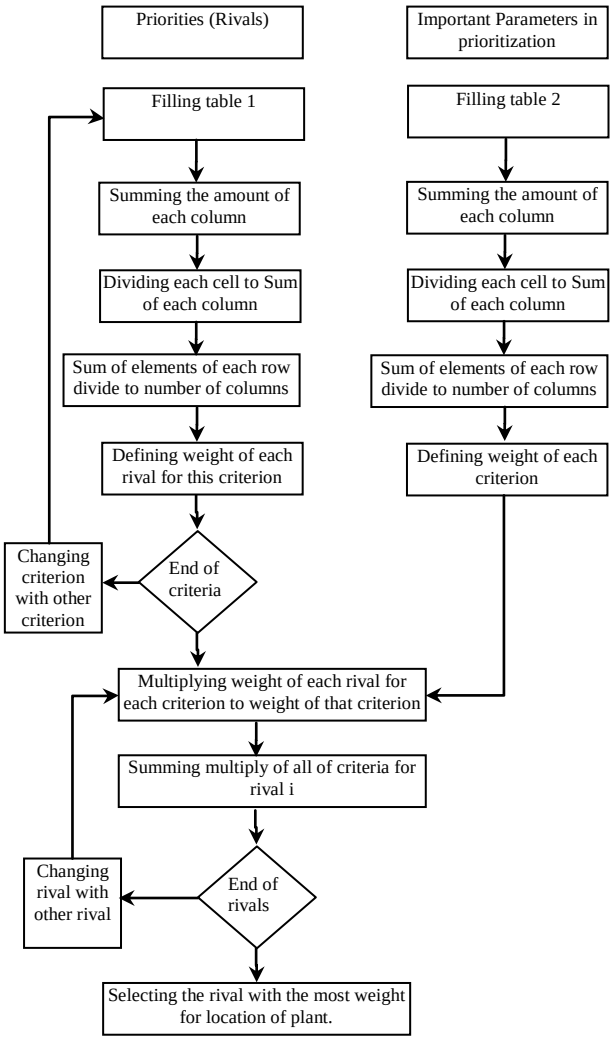

Figure 2 Diagram for AHP method in selection of plant location.

Selecting location for construction of petroleum coke plant by Ranking method

In this method each criterion is achieved a score and a weight. Each alternative that has more score and weight is selected. In this method firstly the locations are selected then each of factors effecting in selecting candied location or locations are scored and compared relatively. This scoring in case can be between 0 and 100 or each other basis. The best option from point of view of each factor have the high score (100) and the other options are scored and compared relative to that option. Then by multiplying weight to assigned score by decision maker, the score of each criterion related to candied location can be defined. By summing the all of scores related to each location the result will be final score of that location. If this process assign to all location therefore for each location there will be a score.

By descending or ascending those numbers, option with high score will be the best option. Also the next formula will use for normalizing the items:

$$\text{Normalizing relationship} = \frac{X_i - X_{min}}{X_{max} - X_{min}} * 100$$

Table 6 Scoring all criteria for defining location of petroleum coke plant.

Criteria	Tabriz	Tehran	Bandaabbas	Shiraz	Isfahan	Abadan (unit …)		
						200	60	75
Feed capacity and assigning to coking unit	133	378	1684	68	1989	1993	1993	1993
Feed quality	391	424	149	317	188	447	347	178
Proximity to internal consuming market	1000	625	1375	625	1250	1583	1583	1583
Proximity to see, railway & airport	200	200	300	200	200	290	290	290
Industrial background of site	50	50	100	50	50	100	100	100
Suitable infrastructure	0	0	100	0	0	100	100	100
Environmental effects	40	40	80	80	40	100	100	100
Land cost	91.4	0	94.3	97.1	82.9	100	100	100
Skilled human labor	90	100	60	80	90	50	50	50
Proximity to countries for export	40	0	100	0	0	90	90	90

Table 7 Weighting and normalized criteria for petroleum coke plant.

Criteria	Tabriz	Tehran	Bandaabbas	Shiraz	Isfahan	Abadan (unit …)			weight
						200	60	75	
Feed capacity and assigning to coking unit	3.4	16.1	83.9	0	99.8	100	100	100	30
Feed quality	81.2	92.2	0	56.4	13.1	100	66.3	9.6	40
Proximity to internal consuming market	39.1	0	78.3	0	65.2	100	100	100	5
Proximity to see, railway & airport	50	50	100	50	50	95	95	95	5
Industrial background of site	50	50	100	50	50	100	100	100	2.5
Suitable infrastructure	0	0	100	0	0	100	100	100	2.5
Environmental effects	40	40	80	80	40	100	100	100	5
Land cost	91.4	0	94.3	97.1	82.9	100	100	100	2.5
Skilled human labor	90	100	60	80	90	50	50	50	2.5
Proximity to countries for export	40	0	100	0	0	90	90	90	5

As it is clear on base of tables 6 to 8, constructing petroleum coke near Abadan oil refinery is propos able. After Abadan refinery, also Bandarabbas refinery because of proximity to aluminum plant and also accessibility to port and railway has more priority related to the other refineries. While assigning capacity in this private refinery needs to have agreement of the stakeholders and

by regarding that the quality of vacuum residual will cause more cost for feed preparation, selecting this refinery has less interesting comparing to Abadan refinery. The other refinery with possibility of assigning feed is Tehran refinery that has less attractiveness than Abadan and Bandarabbas refineries.

Table 8 Scoring and defining location of petroleum coke plant.

Criteria	Tabriz	Tehran	Bandaabbas	Shiraz	Isfahan	Abadan
Feed capacity and assigning to coking unit	101.5	482.5	2517.9	0	2993.7	3000
Feed quality	3247	3689	0	2255.6	523.5	4000
Proximity to internal consuming market	195.7	0	391.3	0	326.1	500
Proximity to see, railway & airport	250	250	500	250	250	475
Industrial background of site	225	250	150	125	225	125
Suitable infrastructure	0	0	250	0	0	250
Environmental effects	200	200	400	400	200	500
Land cost	228.6	0	235.7	242.9	207.1	250
Skilled human labor	225	250	150	200	225	125
Proximity to countries for export	200	0	500	0	0	450
Score	4872.8	5121.6	5094.9	3473.4	4950.5	9675
Normalized score regarding to all criteria	41	44	44	24	42	100

Using flowchart from Matlab software

Defined algorithm in previous sections (Fig. 2) have been used for programming in Matlab software (Version 2010). For this purpose there is the possibility of using two system: M.file and GUI. After some reviewing usage of M.file system has been chosen.

Implementing AHP method flowchart

In this program after coding, there is an environment for user that contains 2 section for inputting data. In first section comparison between two criteria is done and in the next section comparison between two rival for all of them is done. In all of this sections, information for all of two items (criteria and rivals) input by user and comparison will be done by program. In third section, output of the program will be submitted by a chart. This chart has two axes. Horizontal axe is for rivals and vertical axe is for final weight of rivals. In this chart, rival by highest weight is the most prior for selection.

Table 9 Dual comparison of criteria for AHP method.

	A	Bt	C	D	E	F	G	H	I	J
A	1.00	1.33	8.00	8.00	16.00	16.00	8.00	16.00	16.00	8.00
B	0.75	1.00	6.00	6.00	12.00	12.00	6.00	12.00	12.00	6.00
C	0.13	0.17	1.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
D	0.13	0.17	1.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
E	0.06	0.08	0.50	0.50	1.00	1.00	0.50	1.00	1.00	0.50
F	0.06	0.08	0.50	0.50	1.00	1.00	0.50	1.00	1.00	0.50
G	0.13	0.17	1.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
H	0.06	0.08	0.50	0.50	1.00	1.00	0.50	1.00	1.00	0.50
I	0.06	0.08	0.50	0.50	1.00	1.00	0.50	1.00	1.00	0.50
J	0.13	0.17	1.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00
Sum	2.50	3.33	20.00	20.00	40.00	40.00	20.00	40.00	40.00	20.00

Tables 9 to 11 show the most important input data for using program in Matlab for calculating the final score of all rivals in AHP method. Fig. 3 show the difference between the result of these two methods in defining the best option for location of constructing petroleum coke plant.

Table 10 Result of comparison between rivals about criteria (capacity).

Capacity	Tabriz	Tehran	Bandarabbas	shiraz	Isfahan	Abadan
Tabriz	1.00	0.29	0.09	41.19	0.08	0.09
Tehran	3.46	1.00	0.32	142.63	0.29	0.32
Bandarabbas	10.66	3.08	1.00	438.96	0.88	0.99
shiraz	0.02	0.01	0.00	1.00	0.00	0.00
Isfahan	12.14	3.51	1.14	500.00	1.00	1.13
Abadan	10.76	3.11	1.01	443.20	0.89	1.00
Sum	38.05	10.99	3.57	1566.98	3.13	3.54

Table 11 Weight of each rivals in relation to each criterion.

	A	B	C	D	E	F	G	H	I	J
Tabriz	0.03	0.24	0.14	0.14	0.20	0.00	0.11	0.20	0.19	0.17
Tehran	0.09	0.27	0.00	0.07	0.23	0.00	0.11	0.00	0.21	0.00
Bandarabbas	0.28	0.00	0.28	0.27	0.14	0.50	0.21	0.20	0.13	0.43
Shiraz	0.00	0.16	0.00	0.14	0.11	0.00	0.21	0.21	0.17	0.00
Isfahan	0.32	0.04	0.23	0.14	0.20	0.00	0.11	0.18	0.19	0.00
Abadan	0.28	0.29	0.35	0.26	0.11	0.50	0.26	0.21	0.11	0.39

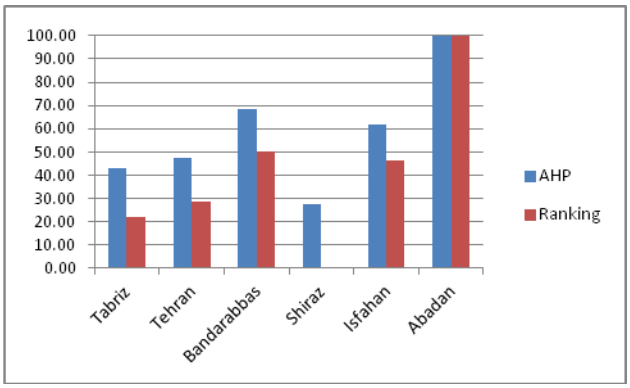

Figure 3 Results of AHP and Ranking methods.

Conclusion

In multicriteria decision making instead of using one criterion for assessing optimistic situation, different criteria will be used. These decision making models divide to two group: Multiple Objective Decision Making (MODM) and Multiple Attribute Decision Making (MADM). MODM uses for planning and design and MADM uses for selection the most suitable option. On the other hand, site location selecting methods contains: Ranking, Mean and AHP methods, In this paper two method of Ranking and AHP have been used for site location of petroleum coke plant.

AHP that has been used for decision making use all of criteria. This technique have strong fundamental basis and by using that complex decision making processes can be formulate and sole more simple. For doing this these steps must be done: Defining and obtaining hieratical of attributes, Weighting and scoring, and defining level of unfit ability.

The most important problem with AHP method is that this method assumes that all of factors are not relative. The results of this study for subject of this paper by AHP method is that Abadan refinery as in raking method is the best option for locating petroleum coke plant. Noticing to

this study it can be written that in shortage of information Ranking method can be used instead of AHP , but by having enough information it is better to use AHP for increasing the accuracy of evaluation.

References

[1] J. Asgharpour, Multicriteria Decision Making.

[2] Dr. Ghodsipour, AHP.

[3] www.expertchoice.com.