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"Application of Multiple Utility Functions in Locating the Establishment of Date Conversion Industries in Sistan and Baluchestan Province"

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ABSTRACT

Dates conversion industries are important processes in the palm production sector, which can use the surplus technology to add value to the production of this sector increase the economic development of the region, and increase the income of palm trees. Sistan and Baluchestan are second in terms of the level of cultivation in the country, but in terms of the development of the conversion and complementary industries, they are not in a good position and can not use the added value of their products, so the development of this industry is necessary and to prevent the waste of locating resources suitable for these industries is very important. the purpose of this research is to apply the multiple utility function in locating the establishment of the date-switching industries of Sistan and Baluchestan provinces. The data used was collected through the completion of the questionnaire by elites and experts in the agricultural sector, especially dates in the province. In the present study, 18 criteria and 9 cities were examined and their prioritization was based on experts' opinion. In this study, Multi Attribute Utility Theory (MAUT) was used to rank potential locations of the data processing industries. And cities based on access to palm trees, cultivated surface, access to infrastructure, and ... In a better position, it was considered the most desirable place, and eventually, the city of Iranshahr was selected as the best place for the establishment of date conversion industries in the province.

1. Introduction

The agricultural sector is considered as a complement to the industry. Since food security is directly linked to national security, many countries are trying to strengthen this sector. Despite its vast capacities such as diversification of industries, favorable climate conditions, possibility of producing tropical crops and high quality of agricultural production ‹Unfortunately, in our country, the relationship between industrial and agricultural development has not been much appreciated [17]

The agricultural processing industry consists of a series of industrial products derived from the processing of raw materials and agricultural intermediary products [11]. creation and development of conversion and supplementary industries of date products due to its effect on job creation and poverty, reducing waste, increasing productivity and added value ‹The development of exports, evaluation and sustainable development of rural areas is of particular importance [2]

However, incorrect locating of these industries and not observing environmental considerations has led to damage to the environment and, on the other hand, has led to ‹These industries themselves are also subject to natural threats such as earthquakes and floods. Therefore, choosing the right location for the establishment of industries should be based on environmental criteria. Observing the correct location principles can reduce these problems, and success in this area requires more attention from the authorities to the location research and production of related maps [3]. As a result, proper organization is essential for the establishment of industrial activities, because optimal deployment results in better economic efficiency, reduced environmental problems, increased market penetration and improved profitability (optical partners) ‹1394.

Sistan and Baluchestan Province due to the high production capacity of dates ‹It has significant potential for economic development and employment creation using the development of the agricultural sector, and the proper location of date processing industries plays an important role in the sustainable development of the province. Choosing the right locations according to factors such as proximity to production centers, access to water and energy resources, and an efficient transport network can increase productivity and reduce production costs. This will help create sustainable employment, reduce irregular migration to cities and improve the supply chain of date crops. Deploying processing industries at the right points can increase the quality of products and enhance their competitiveness in domestic and foreign markets ‹As a result, it will cause economic growth and reduce deprivation in the province.

2. Literature review

The level of cultivation of date crops in Iran in 2020 was 268811 hectares, of which 41807 hectares is related to the non-fertile surface and 227004 hectares is the fertile surface. And the amount of date production in the country in 2020 is equal to 1335652 tons, and the yield of the date product is also reported at 82286. Also, the production rate of this product in Sistan and Baluchestan province has been reported to be 242093 tons, and the performance of this product is equal to 80286. In general, the figures related to the level, production and performance of the date product increased to 2020 compared to 2019. In the province there are 40 units in the field of refrigeration and conversion industries. Who works in the field of warehousing and packaging or processing [19].

Dates, in addition to being nutritionally important, are a major non-oil export product, and the development and promotion of the conversion and supplement industries of dates creates added value and helps to create jobs and can improve the export of this product. There are about 50 industrial units in the field of dates in the province, including a refrigeration unit, a packaging and processing unit, and unfortunately, due to the lack of proper investment and poor participation of the private sector, provinces with the fifth and sixth rank of date production in terms of packaging and processing are more suitable than Sistan and Baluchestan [12].

About 30 types of datesare cultivated in the Balochestan region. Halileh, Mozafati, Katumi, Negal and Shakari are among the cultivars of dates cultivated in Sistan and Baluchestan province. The harvest of dates from June in the province begins with early cultivars, including

katomi, nagal and ashobe, and ends with late figures of Mikeli and Halile in November. Harvest of extra dates with a subculture level of 25000 hectares and date of rabies with a subcutaneous level of 21 thousand hectares, which has the most palm trees, begins in the first half of August. Additional dates with a cultivated surface of 28 thousand and 400 hectares and Rabi dates with a cultivated surface of 22 thousand and 500 hectares, which are the largest palm trees in Sistan and Baluchestan. Of the 62 thousand and 914 hectares of palm trees in Sistan and Baluchestan, 49 thousand and 718 hectares are fertile and 275 thousand tons of dates are produced annually in the province. The dates produced by Sistan and Baluchestan, in addition to other provinces,are exported to the Persian Gulf, European and Russian countries. Most of the palm trees of the province are located in the cities of Saravan, Iranshahr, Nikshahr, Apples and Soran. Also, the cultivation of dates in the province has provided employment for more than 40000 people [1].

The transformation and complementary industries, due to their important position and effective role as the interface between the production stages to date consumption, can be received through various operations and stages; processing, packaging, warehousing, marketing and sales convert the primary raw product into a value-added food product or product and market it. Due to the variety of dates and the presence of dates with lower degrees in terms of quality and taste - which will not be suitable for direct supply in the market - if the conversion industries supply them, they can be used as raw materials in the conversion industries, such as date sap, liquid sugar, vinegar, etc. used industrial materials such as alcohol, etc., and used its pulp and core for livestock feed and other food and medicine. In this regard, planning for the construction of industrial conversion units and the guidance of investors in these industries is very important [19].

In the province, there are about 50 industrial units in the field of dates in the province, including the cold storage unit, the packaging and processing unit, and unfortunately, due to the lack of proper investment and low-color participation of the private sector ،Provinces with the fifth and sixth place of date production are more suitable in terms of packaging and processing compared to Sistan and Baluchistan [6].

Rural areas of Sistan and Baluchestan face serious problems in creating employment and income opportunities, and one of the main challenges of rural society in these areas is the creation of employment, one of its solutions and the development of conversion and supplementary date industries, which can cause a sustainable occupation. In addition, the mechanization for the establishment of date processing industries in the province should be considered by the authorities, and the development of this sector and the establishment of processing industries can provide conditions for the economic development of the region. Also, the right place for these industries is considered as an important factor in the development of these industries, because the place is based on the growth of employment of industries ،The profitability of industries and their competition has an impact that doubles its importance and the results become apparent in the long run, with significant effects on economic, environmental, social dimensions and ... has. Achieving great goals in the current turbulent environments is achieved by strategic planning and due to the very important position of the conversion industries in the economy of Sistan and Baluchestan province.

We will look at the research that will make past information and research usable for present research and help to find the best possible methods for locating in the area of the case Study to choose.

Chetinkaya et al. (2023), have examined the choice of mass vaccination location: The application of GIS and the entropy-based (Maut) approach. They first selected vaccination site selection criteria and then, after collecting location data and mapping using the GIS Geographic Information System and EWM entropy weighting method, determined the relative importance of the criteria. MAUT has been used to rank potential vaccination sites. According to the results , the area around the monument was chosen as the best area.

In another Dugoma (2023) study, he analyzed RS and GIS potential groundwater areas in the upper Nile River basin, Ethiopia. His goal is to classify potential groundwater areas (GWPZ).

The Upper Blue Nile River Basin (UBN) has been investigated using Remote Sensing (RS) and GISS. The GWPZA region is in a weak and very weak position. GIS and RS techniques have been successful in drawing GWPZ.

In their paper, Arogeo et al. (2023) examined the composition of GIS, MCDA and AHP to select the most suitable location for primary health care centers. Their goal is to find the best places in the study area for new PHCs facilities. They used Geographic Information System (GIS) methods, Multi-criteria decision Analysis (MCDA) and Analytical hierarchy process (AHP) to provide a new method for selecting acceptable locations. The results showed that in the mass of the earth the research area; Only 10% of them were the most suitable areas, while 53% of the places were suitable and 37% of the areas were inappropriate. They found that integrating these methods was useful for evaluating the site's suitability for PHCs.

Taufik et al. (2021) in their research, implementing the Multi-feature usefulness theory (Maut) method for selecting diplomats, considered the MAUT method a good method, and 94% of the results were calculated to calculate the selection of foreign diplomats with this method. Akpano Morimoto (2022) has examined rural road prioritization to improve rural access in Nigeria. They have used the Multi-feature usefulness theory (Maut) to examine how rural roads in the state of Aqua-Ibom. They used decision-making criteria that included social, economic, demographic, financial and political. They chose the 10 roads that bring the most social and economic benefits.

Afshari et al. (2020), in their research,they examined the location of industries using multi-criteria assessment methods in Golpayegan city. They used a combination of hierarchical analysis and multi-criteria evaluation and a review of 24 criteria. Important criteria in the assessment includedistance from the wildlife refuge of the dead, distance from faults, distance from wells and distance from the roads. The role of evaluation is provided in GISS. The results of the survey showed that the appropriate areas for industrial development are located in the southeast of the region, so policiesand planning and investmentsshould be paid special attention to these areas.

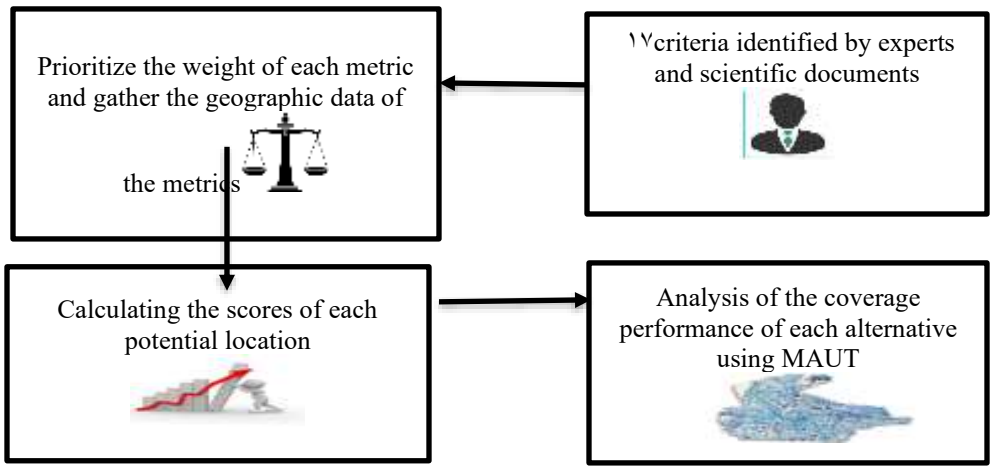
2.1. case study

Sistan and Balochestan province in southeastern Iran has 54 cities, 142 villages. Population statistics of the province in 1401, whose urban population is 3,150 thousand, which includes 1,672 thousand urban population and 1,478 rural population. The total arable land is 419,565 hectares. The value added share of the agricultural sector in the GDP of the province in 1400 (%) is 8/18%. The total arable land in the province is 419,565 hectares, of which 169,533 hectares contain the area under cultivation of agricultural crops and 105,153 hectares of the area under cultivation of horticultural crops [1]. Agricultural products are produced in the cities of iranshahr, Seb and Soran, fanuj, nikshahr, ghasrghand, dalgan, bampur, Sarbaz, meherestan, Chabahar, Saravanan and Konarak [8]

3. Methodology:

MAUT consists of a decision maker who will choose among a number of options based on two or more criteria (indicators) or characteristics, and these options include risk and uncertainty, and the decision maker It wants to achieve maximum desirability [7].

Steps to dete rmine the final rank using the Maut method:



According to the chart above, the identification of different criteria was first done using the opinion of experts in the agricultural sector ،The weights for each criterion will then be determined according to their relative importance, and the utility function will be defined and the criteria will be ranked based on their rating value.

The right choice software calculates final utility scores, alternative rankings, and overall utility scores. It also facilitates sensitivity analysis [5].

The mautt method is based on Newman and Morrison's theory of utility. The term utility means the level of satisfaction of the decision maker from the option and the development of the theory of traditional utility. In economics, where the decision maker faces risk and uncertainty, this theory can have many applications. In this method for the option, according to the level of desirability of the decision-maker, they consider a mathematical function as the utility function, then, given the importance of the index and the utility of each option in each, the index of a general utility function for each option is extracted and finally options are ranked based on this general utility function [13].

It also provides a logical way to make decisions about variables. In this method, quantitative and qualitative methods can be used together, and because it is quantitative and qualitative in this research, it has been used. After the formation of the decision matrix and determining the weight of the criteria , the stages of the method are applied [16].

The MAUT method is used to make decisions about variables and give a common basis. In this way, quantitative and qualitative criteria can be used. The emphasis of this method is on the formation of a utility function separately for each indicator and according to experts.

The inputs of this method are as follows:

1) matrix of decision

2) take the weight of the indicators

Type of desirability function of each indicator [15].

The final desirability functions are considered the best alternative (virtual or real) for the best final desirability score criterion 1 and for the worst virtual or real alternative to a zero-point Kha criterion. If weights are normalized, the final desirability score of an alternative is always a number between zero and one.

Barry the calculation of the final desirability functions of the decision maker must re-scale the raw functions between 0 and 1, followed by normalization. Normalization is usually the basis for the minimum and maximum performance of substitutes per metric. Its relationship is shown in the following form to maximize the benchmark.

$$f'(a_i) = \frac{f(ai) - \min fj}{\max(fj) - \min(fj)} \quad (4.1)$$

The following relation is used to minimize the model:

$$f'(a_i) = \frac{\min(fj) - (fj)(ai)}{\max(fj) - \min(fj)} \quad (4.2)$$

The final desirability score is calculated through the following relation:

$$U_1(a_j) = \frac{\exp(f'j\,(ai)2 - 1}{1.71} \quad (4.3)$$

In the MAUT method the function of desirability and weights indicate consumer preferences for each metric. Right choice is used to know when the ranking changes after a particular weight is changed [5]

4. Results:

This chapter aims to present the results obtained from data analysis. The research used the Maut futuristic method and Multi-Criteria Decision Analysis for the Futurism and location of Palm conversion industries in Sistan and Balochestan. Descriptive-analytical research methodology has been used using library document studies and field observation. For the futuristic method, the questionnaire was completed by experts and experts using quantitative and qualitative models, and structural analysis, scenarios and Delphi methods were used, which were analyzed using the cross-effects Matrix method and scenario writing, and scenarios will be presented for the development of the palm processing industry sector in Sistan and Balochestan province.

To analyze the decision-making of several criteria, a questionnaire was provided to the experts of the Khurram Department of Sistan and Balochestan. The weighting of the criteria was done using paired comparisons of hierarchical analysis and the relative importance of the indicators was achieved. Then the Multi-Indicator desirability function for each option was obtained, and the final desirability of each option and the ranking of options were created.

Primary weight criteria in different cities:

	zahak	**zahedan**	**chabahar**	**mirjaveh**	**khash**	**sarbaz**	**iranshahr**	**saravan**	**nikshahr**
Access to the Grove	0.010	0.024	0.120	0.087	0.015	0.111	0.247	0.288	**0.98**
Subculture level	0.013	0.029	0.063	0.036	0.032	0.102	0.289	0.300	**0.0137**
Varieties and variety of dates	0.010	0.013	0.043	0.046	0.052	0.123	0.303	0.232	**0.178**
Workforce with the necessary skills	0.023	0.034	0.066	0.034	0.025	0.170	0.256	0.235	**0.0158**
Cheap labor	0.053	0.047	0.016	0.087	0.020	0.157	0.277	0.174	**0.167**
Access to infrastructure (water, electricity and gas)	0.069	0.327	0.149	0.096	0.055	0.048	0.126	0.070	**0.060**
Rail access	0.022	0.395	0.222	0.125	0.104	0.012	0.069	0.011	**0.041**
Transit road access	0.062	0.371	0.201	0.068	0.050	0.028	0.082	0.022	**0.117**
The possibility of deploying an industrial town	0.021	0.412	0.219	0.075	0.036	0.011	0.120	0.046	**0.059**
Access to appropriate	0.013	0.016	0.033	0.061	0.032	0.162	0.288	0.283	**0.113**

figures for the development of industries									
The actual capacity of individuals and institutions to invest in the region	0.010	0.133	0.295	0.228	0.016	0.036	0.061	0.200	**0.022**
Potential capacity of individuals and institutions to invest in the region	0.010	0.123	0.338	0.180	0.021	0.095	0.110	0.109	**0.014**
Financing and facilities	0.012	0.440	0.248	0.088	0.033	0.015	0.090	0.050	**0.024**
Access to domestic markets	0.019	0.376	0.213	0.044	0.033	0.041	0.153	0.042	**0.078**
Access to foreign markets	0.051	0.364	0.252	0.150	0.019	0.016	0.039	0.090	**0.019**

TABLE 1. Primary weight criteria in different cities

Source: research findings

Compared to the ranking of cities in the access to the palm grove of Saravan city with a weight of 0.288, the highest relative weight and the city of zahak with a weight of 0.010 is the lowest weight. Compared to the ranking of cities in the area under cultivation of Saravan city with a weight of 0.30, the highest relative weight and zahak city with a weight of 0.013 is the lowest weight. Compared to the ranking of cities in the amount of figures and variety of dates, the city of iranshahr weighs 0.303 with the highest relative weight and the city of Zahak with the lowest weight 0.010. Compared to the ranking of cities in the ranking of skilled labor in Iran, the iranshahr with a weight of 0.256 is the highest relative weight and the city of Zeke with a weight of 0.023 is the lowest weight. In comparison, the ranking of cities for the ranking of cheap labor in iranshahr with a weight of 0.277 is the highest relative weight and the city of Chabahar with a weight of 016/0 is the lowest weight. Compared to the ranking of cities in the ranking of access to infrastructure, the city of Zahedan weighed 0.327 with the highest relative weight and the city of soldier weighed 0.048 with the lowest weight. Compared to the ranking of cities in the railway access ranking of Zahedan city with a weight of 395/0, the highest relative weight and Saravanan city with a weight of 0.011 is the lowest weight. In comparison, the ranking of cities in access to the transit road in Zahedan city with a weight of 0.371 is the highest relative weight and Saravan city with a weight of 0.022 is the lowest weight. Likewise, the ranking of cities based on the possibility of deploying the industrial town of Zahedan city with a weight of 412/0 is the highest relative weight and the soldier city with a weight of 0.011 is the lowest weight. Compared to the ranking of cities in the ranking based on access to

appropriate figures, the city of iranshahr with a weight of 0.288 is the highest relative weight and the city of zhak with a weight of 0.013 is the lowest weight. Also in the comparison section, the ranking of cities in the ranking is based on the presence of the actual capacities of the city of Chabahar with a weight of 0.295 the highest relative weight and the city of zahak with a weight of 0.010 the lowest weight.

In the comparison section, the ranking of cities in the ranking is based on the presence of potential capacities of the city of Chabahar with a weight of 0.0388 the highest relative weight and the city of zhak with a weight of 0.013 the lowest weight. Compared to the ranking of cities in the ranking based on the financing and facilities of the city of Zahedan with a weight of 0.440, the highest relative weight and the city of Zahedan with a weight of 0.012 is the lowest weight. Compared to the ranking of cities in the ranking based on access to domestic markets, the city of Zahedan weighed 0.376 with the highest relative weight and the city of Zahedan weighed 0.019 with the lowest weight. Also, compared to the ranking of cities in the ranking based on access to foreign markets, Zahedan City weighed 0.364 is the highest relative weight and soldier City weighed 0.016 is the lowest weight.

The results of the calculations of the initial weights of the criteria in different cities show that the city of iranshahr has the highest weight in most criteria

Normalized value of industrial location metrics:

	nikshahr	**saravan**	**iranshahr**	**sarbaz**	**khash**	**mirjaveh**	**chabahar**	**zahedan**	**zahak**
Access to the Grove	0.317	1.000	0.853	0.363	0.018	0.277	0.396	0.050	0.000
Subculture level	0.449	1.040	1.000	0.322	0.069	0.083	0.181	0.058	0.000
Varieties and variety of dates	0.573	0.758	1.000	0.386	0.143	0.123	0.113	0.010	0.000
Workforce with the necessary skills	0.579	0.910	1.000	0.631	0.009	0.047	0.185	0.047	0.000
Cheap labor	0.579	0.605	1.000	0.540	0.015	0.272	0.000	0.119	0.142
Access to infrastructure (water, electricity and gas)	0.043	0.079	0.280	0.000	0.025	0.172	0.362	1.000	0.075
Rail access	0.078	0.000	0.151	0.003	0.242	0.297	0.549	1.000	0.029
Transit road access	0.272	0.000	0.172	0.017	0.080	0.132	0.513	1.000	0.115
The possibility of deploying an industrial town	0.120	0.087	0.272	0.000	0.062	0.160	0.519	1.000	0.025
Access to appropriate figures for the development of industries	0.364	0.982	1.000	0.542	0.069	0.175	0.073	0.011	0.000

The actual capacity of individuals and institutions to invest in the region	0.042	0.667	0.179	0.091	0.021	0.765	1.000	0.432	0.000
Potential capacity of individuals and institutions to invest in the region	0.012	0.302	0.305	0.259	0.034	0.518	1.000	0.345	0.000
Financing and facilities	0.028	0.089	0.182	0.007	0.049	0.178	0.551	1.000	0.000
Access to domestic markets	0.165	0.064	0.375	0.062	0.039	0.070	0.543	1.000	0.000
Access to foreign markets	0.009	0.213	0.066	0.000	0.009	0.385	0.678	1.000	0.101

TABLE 2. Normalized value of industrial location metrics

Source: research findings

The normalized value of the various criteria is given in the table above . In iranshahr, where palm cultivation is traditionally one of the important agricultural sectors of the city, the establishment of conversion industries in this place is a more suitable option than in other cities because in metrics such as the amount of varieties and variety of Palm, skilled labor, cheap labor, suitable figures have more weight and are the best option among other cities in the province.

Final desirability values for the criteria:

	niksh ahr	**sarava n**	**iransha hr**	**sarba z**	**khas h**	**mirjave h**	**chabah ar**	**zaheda n**	**zaha k**
Access to the Grove	0.062	1.005	0.625	0.083	0.000	0.047	0.097	0.001	0.000
Subculture level	0.131	1.139	1.005	0.064	0.003	0.004	0.020	0.002	0.000
Varieties and variety of dates	0.228	0.454	1.005	0.094	0.012	0.009	0.007	0.000	0.000
Workforce with the necessary skills	0.233	0.753	1.005	0.286	0.000	0.001	0.020	0.001	0.000
Cheap labor	0.232	0.259	1.005	0.198	0.000	0.045	0.000	0.008	0.012
Access to infrastructure (water, electricity and gas)	0.001	0.004	0.048	0.000	0.000	0.018	0.082	1.005	0.003
Rail access	0.004	0.000	0.013	0.000	0.035	0.054	0.206	1.005	0.000

Transit road access	0.045	0.000	0.018	0.000	0.004	0.010	0.176	1.005	0.008
The possibility of deploying an industrial town	0.008	0.004	0.045	0.000	0.002	0.015	0.181	1.005	0.000
Access to appropriate figures for the development of industries	0.083	0.949	1.005	0.200	0.003	0.018	0.003	0.000	0.000
The actual capacity of individuals and institutions to invest in the region	0.001	0.327	0.019	0.005	0.000	0.465	1.005	0.120	0.000
Potential capacity of individuals and institutions to invest in the region	0.000	0.056	0.057	0.041	0.001	0.180	1.005	0.074	0.000
Financing and facilities	0.000	0.005	0.020	0.000	0.001	0.019	0.208	1.005	0.000
Access to domestic markets	0.016	0.002	0.088	0.002	0.001	0.003	0.201	1.005	0.000
Access to foreign markets	0.000	0.027	0.003	0.000	0.000	0.093	0.341	1.005	0.006

TABLE 3. Final desirability values for the criteria
Source: research findings

Scoring of criteria:

Benchmark	Points	Benchmark	Points
Access to the Grove	33.33	Supply of primary institutions	23.14
Subculture level	33.33		
Varieties and variety of dates	33.33		
Workforce with the necessary skills	55.55	Human capital	20.83
Cheap labor	44.44		
Access to infrastructure (water, electricity and gas)	27.77	Access to infrastructure	20.83
Rail access	22.22		
Transit road access	27.77		
The possibility of deploying an industrial town	22.22		
Access to appropriate figures for the development of industries	13.79	Institutional factors	18.98
The actual capacity of individuals and institutions to invest in the region	13.79		
Potential capacity of individuals and institutions to invest in the region	13.79		

Financing and facilities	13.79		
Access to domestic markets	13.79		
Access to foreign markets	13.79		
Access to the Grove	17.24		62.20
Subculture level	42.58	Market access	
Varieties and variety of dates	57.14		

TABLE 4. Scoring of criteria

Source: research findings

The results of the scoring of the criteria based on the opinion of experts show that the criteria for the supply of primary institutions, which includes access to palm trees, the level of cultivation and the variety of dates, has 23.14 points, which is the highest score among other criteria, and has taken on greater importance in the spatial prioritization of Palm conversion industries in the province of Sistan and Balochestan. Institutional factors and access to infrastructure have subsequent ratings. The market access benchmark also ranked last with 16.20 points.

Scoring cities based on criteria:

	nikshahr	**saravan**	**iranshahr**	**sarbaz**	**khash**	**mirjaveh**	**chabahar**	**zahedan**	**zahak**
Access to the Grove	5	1	2	3	8	6	4	7	9
Subculture level	3	1	2	4	7	6	5	8	9
Varieties and variety of dates	3	2	1	4	5	6	7	8	9
Workforce with the necessary skills	4	2	1	3	8	7	5	6	9
Cheap labor	3	2	1	4	8	5	9	7	6
Access to infrastructure (water, electricity and gas)	7	5	3	9	8	4	2	1	6
Rail access	6	9	5	8	4	3	2	1	7
Transit road access	3	9	4	8	7	5	2	1	6
The possibility of deploying an industrial town	5	6	3	9	7	4	2	1	8
Access to appropriate figures for the developmen	4	2	1	3	7	5	6	8	9

t of industries									
The actual capacity of individuals and institutions to invest in the region	7	3	5	6	8	2	1	3	9
Potential capacity of individuals and institutions to invest in the region	8	5	4	6	7	2	1	3	9
Financing and facilities	7	5	3	8	6	4	2	1	9
Access to domestic markets	4	6	3	7	8	5	2	1	9
Access to foreign markets	8	4	6	9	7	3	2	1	5

TABLE 5. Scoring criteria by cities

Source: research findings

In the table above, cities are ranked according to each criterion, for example Seravan city ranks first in the palm access criterion ،Iranshahr also ranks first in the criteria for access to suitable figures for the development of date conversion industries, date varieties and diversity, and the criteria of labor with the necessary skills and cheap labor. Chabahar city in the criteria for the existence of potential capacities and de facto ranks first.

Final favorability points:

We get desirability points and component ratings.

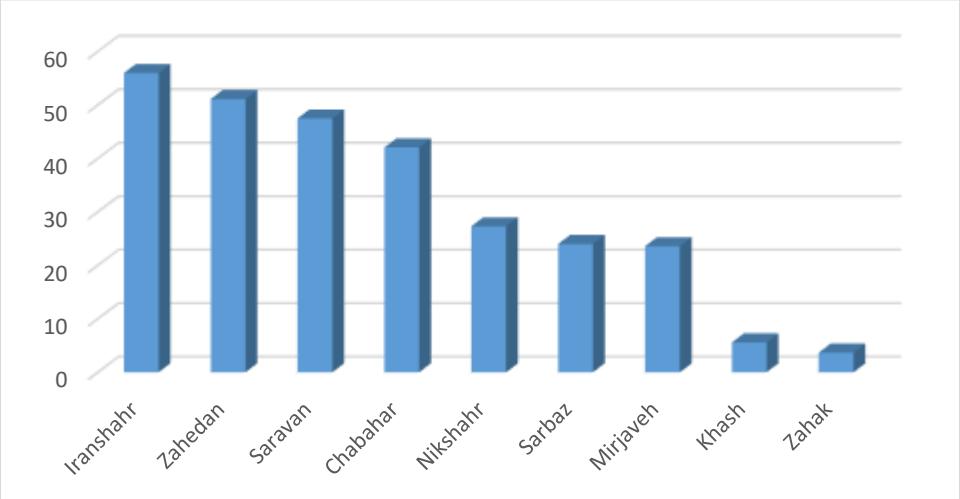


FIGURE 2. Ranking by final desirability points

Source: research findings

Chart 2 shows the ranking based on final desirability scores. As you can see in this graph, iranshahr, weighing 55.957, has been ranked first as the most suitable place for the establishment of palm processing industries. Also, the city of Zahedan weighs 51.119, the city of Saravanan weighs 47.477, the city of Chabahar weighs 42.058, the city of nikshar weighs 27.305, the soldier weighs 24.008, mirjava weighs 23.584, Khas weighs 5.600, and the city of zehak weighs 3.690, the last.

Figure: location priority of the cities of Sistan and Balochestan provinces for the deployment of palm processing industries

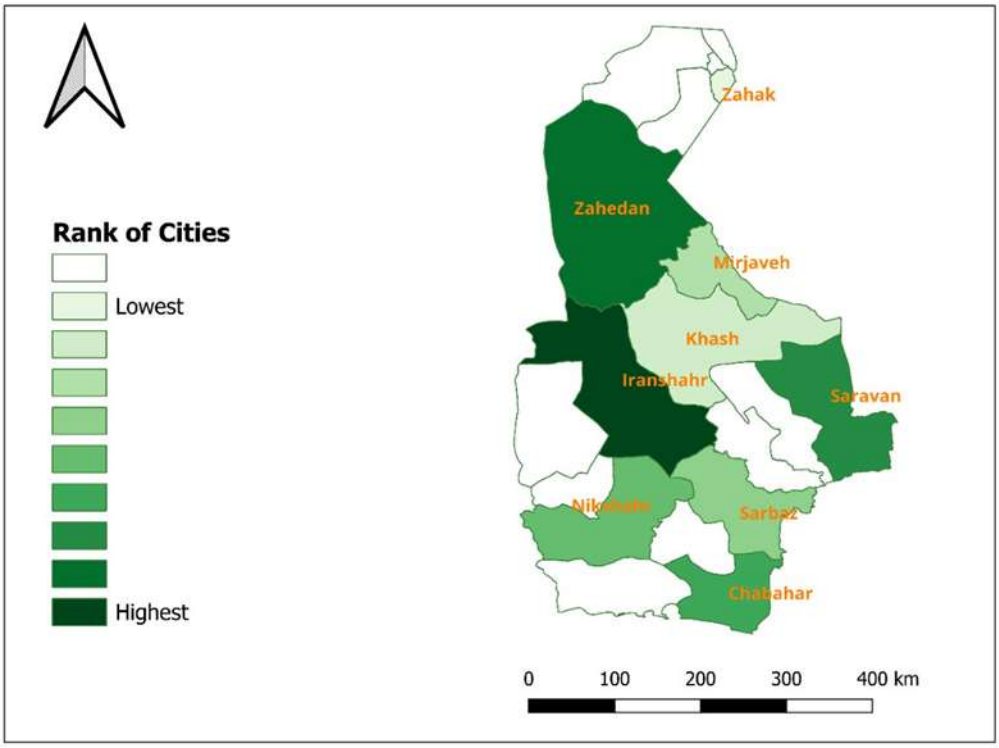


Figure 3: location priority of the cities of Sistan and Balochestan provinces for the deployment of palm processing industries
Source: research findings

5. Discussion and conclusion:

The palm crop in Sistan and Balochestan province is a source of income for farmers and is of great importance in terms of economic and social value. To reach the global market, it is necessary to make appropriate investments in the creation of conversion and complementary industries in the palm growing areas, and to produce by-products of palm with high added value and supply in various markets. These industries will promote industrial and economic development in the region, and because the province of Sistan and Balochestan has the highest unemployment rate in Iran, and the income of many households depends on this product, the development of palm industries in addition to creating added value and value creation for the country, will promote sustainable employment development and reduce poverty. Due to its important position and role in creating a link between the production and consumption stages of dates, these industries can convert and market raw products into value-added food products through various stages of receiving,

packaging, storage, marketing and sales, so location is essential.
Misplaced location will cause a lot of waste of resources and damage. The construction of these industries should be carried out in places where in terms of characteristics such as proper infrastructure, access to domestic and foreign markets, the level of cultivation and diversity of Palm Residences and ... It has the right features because it will make it more economical to use the facilities.
Among the various criteria in locating, the criteria for access to the palm grove, the level of cultivation, the varieties and the variety of dates are the most important. Using the MAUT multiple desirability function technique and using experts from the palm sector of Sistan and Balochistan province, the coefficients and relative importance of various criteria in 9 cities with palm trees, final weights and prioritization among cities were made, and finally the city of iranshahr became the most suitable city and place to create transformation industries, which in terms of characteristics such as the amount of varieties and variety of palm trees, skilled labor, cheap labor, suitable figures and ... It has a better position and the creation of palm processing industries in this region is essential and is a more suitable option than other cities and can promote the development of the region and increase profitability for farmers and reduce unemployment in the region.
Since Iranshahr is not in good condition in the criterion of access to foreign markets, suggestions such as development of cooperation with international commercial companies, attractive multilingual packaging design can be made ،Compliance with international standards and setting up support funds for exporters of date products.
The city also has problems in terms of access to railways, which can be followed by the construction of rail lines near the city to connect to the national railway network of the country in particular Routes connected to the ports of South Africa for maritime exports.
To increase the capacities of the city, which is not in good condition, can be developed with appropriate infrastructure in the region ، Government support and giving appropriate facilities to create conversion industries used the potential of the city. The city, despite its good advantages in the production of dates and the development of conversion industries, has not yet reached a good level. By creating and equipping industrial units to produce various products from dates and improving the quality of packaging, eliminating inappropriate rules, quality control over manufactured products, developing infrastructure facilities such as cold storage ، Warehouse and ...Creating a suitable market in the region, developing a marketing network, innovative packaging, holding a permanent exhibition of processed date products can further develop date processing industries in Iranshahr city.

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