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2023 Volume 21 Issue 3 pp. 177-189

Sensitivity Analysis of Effective Factors in the Lack of Development of Agricultural Mechanization of Fragmented Lands using a Hierarchical Analytical Process in Jiroft, Iran

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Abstract

Mechanization is an approach that makes it possible for the agricultural to reach the stage of commercial production. The development of mechanization in agricultural societies, especially in rural areas of the country, has been associated with problems such as land fragmentation, which recognizing the factors affecting it can help planning to address them. In this study, in order to determine the sensitivity of effective criteria in the lack of development of mechanized fragmented fields in Jiroft, a sensitivity test based on a hierarchical analytical process model was used. Social-family criteria, cultural-communication factors, educational-technical, legal-legal and economic-financial factors were weighed through pairwise comparison and the results were checked using Expert Choice software. Findings showed that the sensitivity of socio-familial factor in Jiroft city is the main factor preventing the underdevelopment of agricultural mechanization in the region, and cultural-communication, educational-technical, legal-legal and economic-financial factors are in the next priorities. By analyzing the sensitivity of the main criteria, the implementation of mechanization development, localization of modern technology, education and promotion, confidence building, granting credit and financial facilities for the modernization of agricultural implements were proposed.

Keywords: Agricultural mechanization development, Hierarchical analytical process, Land fragmentation, Sensitivity analysis

1. Introduction

Land scattering is one of the consequences of the traditional agricultural structure of country (TurkiBoldaji and Ghanbari, 2013). Such an arrangement in the land system is not exclusively for Iran and also exists in most countries with more or less proportions (RezvaniAlvar and Rachel, 2011). Today, researchers, agricultural experts and policy makers, considering the changes that have taken place in the land utilization system, believe that the dispersal and widespread use of agricultural land is one of the main problems of agricultural mechanization development (RezvaniAlvar and Rachel, 2014). Lack of economic justification for the use of technology in the production stage, the low incentive to invest in this area, the low production efficiency and the low economic profit are among the problems caused by the small-peasant farming systems (Mahdavi and Kiani, 2017).

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DOI https://doi.org/10.5281/zenodo.7936583#83

In spite of the extensive efforts taken during the five-year development plans of Iran from 1990 to 2005 with aim of reforming the structure of the agricultural exploitation systems and the establishment and institutionalization of all types of optimum, efficient and appropriate operating system in accordance with socio-economic conditions and agricultural capacities in different regions of the country, agricultural sector continues to face this challenge in its development direction (Bagheri, 2016).

Fragmentation of agricultural lands is one of the major obstacles to sustainable agriculture development and is an obstacle to optimal and eligible use of land, water, manpower, inputs, mechanization, creation of new ideas, precision agriculture and other factors affecting agricultural production and faces the two long-standing problems of smallholder plots, as well as the fragmentation and scattering of land by each farmer which are mainly influenced by these factors: Family-social factors such as benefits of awareness, participation, bias, family disputes and cultural-communication factors such as communication centers, the interests of group work, communication with agricultural service centers, traditional beliefs and educational-technical factors such as access to technical instructions, the presence of specialists, the availability of machines, the holding of workshops and Juridical-legal acts such as dedication, the law of inheritance, the law of participation in partnership with the owner, the way of sharing the land between the partners and economic-financial factors such as price difference between lands, bad economic conditions, machinery and equipment costs, banking facilities and etc. These are nowadays considered as obstacles to the development of agricultural mechanization in the country. This leads to a reduction in productivity, increased costs, inefficient farm management and inefficient use of new technologies, reduced agricultural investment and intensified land use changes and the elimination of small land from the production cycle, inadequate access to finance, a decrease in revenue, rural migration, and hidden unemployment, inadequate use of agricultural mechanization, inadequate use of water resources, and waste of production resources leading to a decline in agricultural output as indicators of underdevelopment(Secretariat of the Fourth Program Headquarters,2005).

Understanding these issues and developing appropriate programs to solve or mitigate them will have implications for the agricultural sector, optimizing the potential of the agricultural sector, increasing production, increasing farmers' income, stabilizing the rural population and agricultural development (NajibiKheirabadi and Maghsoudi, 2010).

In this study, an attempt is made to take an effective step towards the development of agriculture in Jiroft by identifying the prioritization of the factors affecting the lack of development of agricultural mechanization due to the fragmentation of land using the viewpoint of the exploiters of Jiroft city. For this purpose, Hierarchical Analysis Process (AHP) technique has been used. This technique provides appropriate ways to organize information and make judgments and use them in decision-making based on ability, emotion, logic, and subject matter, then the judgments are combined into results that are consistent with internal expectations. The above process to solve complex problems by hierarchical criteria helps us to draw conclusions by extracting judgments to advance priorities (Saati, 1998)

A study conducted in Greece to study land consolidation as one of the ways to develop agriculture in Macedonia. The results showed that soil dispersion is one of the main obstacles to Macedonian agricultural development and the establishment of rural cooperatives and technical funding of the government (Grygewski, 2005). A descriptive-analytical study conducted with a survey approach to evaluate the effects of land consolidation on rural agricultural development, showed that the implementation of the integrated land consolidation plan led to a reduction in the number of agricultural plots, reduced production costs and savings in consumption. It also follows the application of agricultural mechanization in farms, increasing production and improving farmers' incomes (Falsliman and Moradi, 2011). Study to identify and analyze the factors affecting the development of agricultural mechanization in the city of Borujen showed that 45% of farmers are engaged in agriculture on lands with an area of less than 5 hectares and the biggest problem of farmers in

using agricultural mechanization is the price of tools. There is a codified policy and careful planning to accelerate the development process of mechanization and land distribution and subsistence farming (TurkiBoldaji and Ghanbari, 2013).A study based on the library's study method and the study of scientific documents, as well as extensive internet searches in databases to study the history of agricultural mechanization in Iran and its policies in development programs, showed the main challenge facing the development of agricultural mechanization in Iran. The lack of a codified program is large-scale and operational, and the need to develop codified policies in the field of agricultural mechanization has been emphasized (RezvaniAlvar and Rachel, 2014). Comprehensive review of theoretical literature and library resources on the effects of land consolidation on agricultural economics with an emphasis on agricultural development, showed that one of the obstacles to rural development and transition from one stage to another is the distribution of agricultural land. In general classification, its causes include socio-cultural, economic, physical and user factors. On the other hand, agricultural development itself requires two groups of physical production factors (land, seeds, etc.) and non-physical (management). Optimum production requires the presence of physical and non-physical factors of production together (Mohammadzadeh and Amin Fenck, 2015). A study in China examined the estimated effect of land fragmentation on the use of machinery and crop production. The results showed that the integration of agricultural land consumption increases agricultural machinery and increases crop production (Lai and Roe, 2015). To investigate the effect of land size relationship on agricultural mechanization indicators in Qazvin, Iran, the three factors of inheritance, population growth and literacy had a greater impact on the distribution of agricultural land in Qazvin (Hashemipour and Mohammad Zamani, 2016). Examination of the barriers to agricultural land consolidation, showing that farmers are less inclined to integrate and prefer to engage with familiar individuals and families under the condition of temporary consolidation (Mahdavi and Kiani, 2017). In Finland a study on the effects of agriculture and the profitability of land consolidation showed that land consolidation is an effective and viable management tool to improve asset structure and, if implemented, reduce production costs by an average of 15 percent (Hyeronin and Rickenin, 2017).

In this study, the effect of fragmentation of exploitation levels on the development of agricultural mechanization with aim of finding the most important factor on the underdevelopment of Jiroft and providing appropriate solutions is discussed.

2. Materials and Methods

2.1 Description of the study area

The geographical location along with topographic condition has made Jiroft a diverse climate. Climatic conditions, fertile soils, and surface and groundwater resources have provided the basis for the production of millions of tons of tropical and cold products; so that, since a long time ago Jiroft has always been a very important center of agriculture in the country.

The existence of vast and fertile plains and lack of industrial growth and limited-service at the same time has turned this region into a special and unique position in Iranian agriculture. Referring to the opinions of FAO experts around the talents and exceptional characteristics of this region can be sufficient. According to these experts, Jiroft, is a small India and in terms of agricultural talent is comparable to the Nile Delta, southern Spain, and California (Fig. 1). Jiroft with the area under greenhouse cultivation of 1845 hectares is in the third rank and with the production of 305753 tons of greenhouse products is in the second rank of Iran (Table 1). Therefore, considering the volume of agricultural activities in Jiroft on one side and the negative effects of the indiscriminate usage of foreign inputs on human health, environment, and natural resources on the other side, the need for attention and planning for agricultural development in this area is highly reminded. Therefore, the purpose of this research is to Sensitivity assess the factors contributing to

underdevelopment of agricultural mechanization in Jiroft, in 8 villages of the city (sample) with the largest population compared to other villages (Sahibabad, Mijan, Khizr Abad, Darb-e Behesht, Razi Abad, Benstan, Blouk, Karimabad) done. The statistical population of this research was 154867 farmers of agricultural sector that based on Cochran's formula (Equation 1), 384 farmers were selected by simple sampling method. In order to increase the accuracy and correctness of the results, the sample size was increased to 420.

The results of the present article can be used by regional and national managers and policymakers in order to improve agriculture in Jiroft in order to develop agricultural mechanisation.

$$n = \frac{\frac{z^2 pq}{d^2}}{1+\frac{1}{N}\left(\frac{z^2 pq}{d^2}-1\right)} \qquad (1)$$

n: Sample size.

N: The statistical population volume (population volume of the city, province, etc.).

z: The value of the normal variable of the standard unit.

p: The value of the attribute ratio in society. If it is not available, it can be considered 0.5. In this case, the amount of variance reaches its maximum value.

q: The percentage of people who do not have that attribute in society (q = 1-p).

d: The desired degree of certainty or possible accuracy or the amount of error allowed (Sobhani Fard, 2017).

We usually consider p and q equal to0.5. The value of z at the 95% confidence level is 1.96. d can be 0.01 or 0.05.

$$n = \frac{\frac{(1.96)^2 \times 0.5 \times 0.5}{(0.05)^2}}{1+\frac{1}{154867}\left(\frac{(1.96)^2 \times 0.5 \times 0.5}{(0.05)^2}-1\right)} = 384$$

Table 1 Production status of products in Jiroft

Row	Product	Area under cultivation		Manufacturing	
		Amount (hectares)	Rank in Iran	Amount (tons)	Rank in Iran
1	Cucumber	1407	1	280105	1
2	Tomato	14208	1	449794	3
3	Potato	11177	4	268566	5
4	Maize	12520	5	688865	5
5	Citrus	34000	3	450000	3
6	Date	30774	3	193523	3

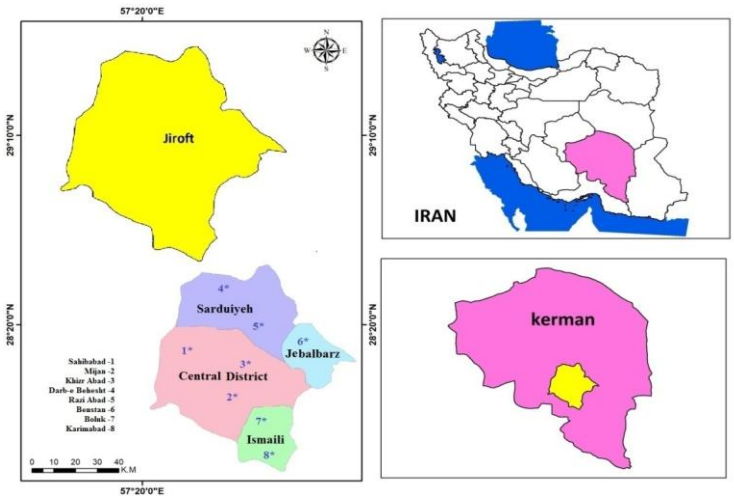

Fig. 1 Geographical location of Jiroft

2.2 Data collection

The collected data were evaluated and processed using a hierarchical technique, which is a group decision making method in complex environments. The basis of this method is the formation of a hierarchical decision tree. Each decision problem can be designed in the form of a tree. The first level of this tree represents the decision maker's purpose. Prioritizing competing options is to achieve this goal. Intermediate levels represent planners' preferred criteria for achieving the goal at the first level. The last level shows the options available to achieve the goal.

In this study, structure of the hierarchical decision tree was designed based on what is shown in Fig. 2. The first level consists of the main objective of prioritizing the factors contributing to the underdevelopment of agricultural mechanization through the fragmentation of lands. The second level involves the basic criteria that influence the research goal, such as the benefits of knowledge, participation, prejudice, and so on. The final level includes the important options derived from the classification of criteria at the second level, including socio-family, cultural-communicational, educational-technical, juridical-legal, and economics-financial factors. In this research, it has been attempted to prioritize among the mentioned factors so that the planners and executives of agricultural mechanization development plan, while identifying the factors preventing agricultural mechanization development due to fragmentation of the land, attempt to eliminate it.

Comparative Tables were prepared based on the above hierarchical structure and paired comparison was performed using a scale that was designed from the same preference to the completely better one. This scale is shown in the Table 2. To calculate the numerical mean after completing the questionnaires by farmers, we will have different views on each of the options. To solve this problem, comparative tables should be combined. After preparing the hierarchical tree of geometric mean calculation, mathematical operations were performed by the Expert Choice 11 software in order to prioritize the effective factors in the underdevelopment of agricultural mechanization due to the fragmentation of the lands. Initially, relative weight of each criterion was estimated according to the purpose of comparison, and in the next step, the relative weight of each option was calculated according to paired comparison criteria.

$$a_{ij} = \left(\pi_{k=1}^{n} a_{ij}^{(k)}\right)^{\frac{1}{n}} \qquad (2)$$

a_{ij}: Average geometric criterion a

a: A criterion that is compared to options

ij: Two options that compare

k: The code of the person who answered the questionnaire questions

n: Number of people who have compared criterion options (Samet, 2003).

Table 2 Comparison of Paired Scales

1	The same preference	Both options have the same effect on the target
3	Slightly better	The preference of one option over another (the comparative option) is small
5	Better	The preferences of one option over another (the comparative option) is strong
7	Much better	The preference of one option over another (the comparison option) is very strong
9	Quite better	The choice of one option over another (the option to compare) is at its maximum
2, 4, 6, 8		The average scores represent the average states of each of the above comparison modes

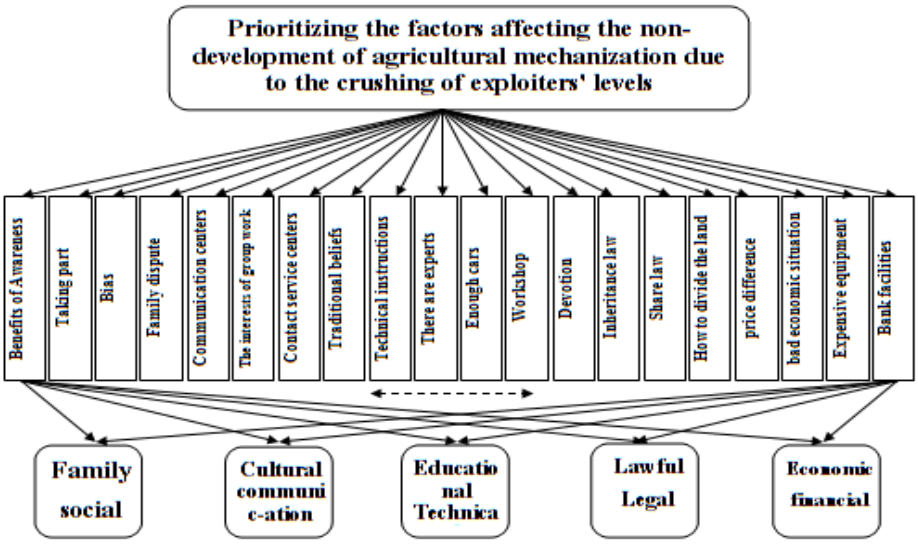

Fig. 2 General structure of the tree hierarchy

In the real world, there is often an inconsistency. These inconsistencies may come into the model. When the incompatibility rate is zero, it means that full compatibility has occurred. As the rate rises, the inconsistency in the target also increases. Generally, if the incompatibility rate is less than 0.1, the incompatibility is relatively acceptable, otherwise a revision in judgment would be necessary.

After comparing the relative weights of the criteria of the options, it is necessary to calculate the final weight of each option. To do this, the integration process was used. In this way, the final answers to the problem were obtained.

3. Results and Discussion

3.1 Comparison of criteria with respect to the purpose

In the first stage, the criteria were compared in pairs with respect to purpose of the study (prioritizing the factors affecting the non-development of agricultural mechanization due to the fragmentation of lands). According to Fig. 3, which shows the pairwise comparison of criteria with respect to the purpose of the research, the criterion of knowledge and technical guidance advantages with the ratio of 0.071 and banking facilities with a ratio of 0.021 has the highest to lowest priority, respectively. The calculated incompatibility rate is 0.07, therefore, the compatibility of the criteria with the objective of the research is acceptable.

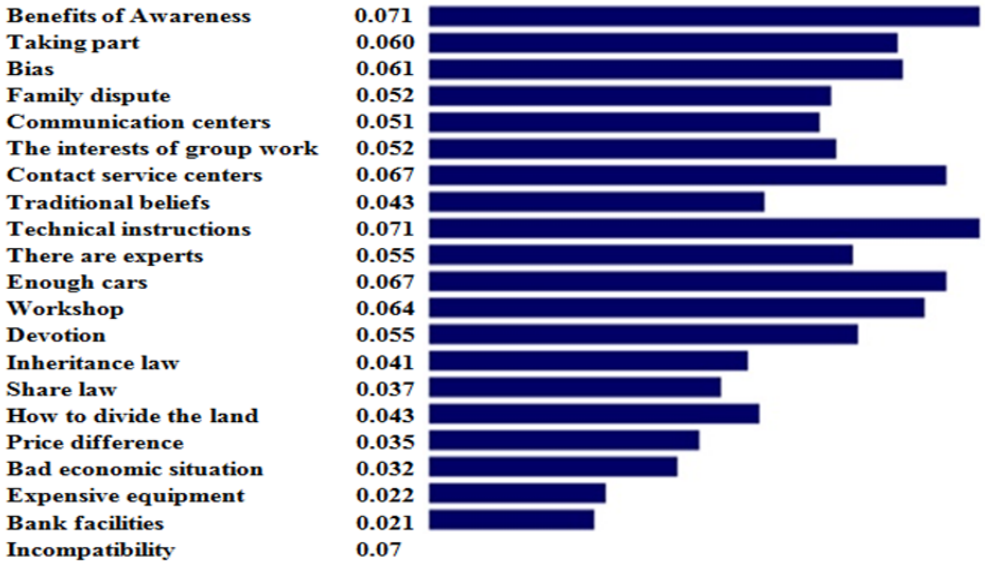

Fig. 3 Comparison of the criteria in a paired relation to the purpose of the research

3.2 Paired comparison of options

In the second step, the options were compared in terms of criteria. Fig. 4 shows the pairwise comparisons of criteria according to the benefits of knowledge. According to Fig. 4, the family-social factor with the ratio of 0.356 and the economic-financial factor with the ratio of 0.041 have the highest and lowest shares respectively. The calculated incompatibility rate is equal to 0.09. Therefore, the compatibility of the criteria of the benefits of knowledge with the options is acceptable.

According to Fig. 5, which shows a pairwise comparison of criteria with respect to participation criterion, the family-social factor with the ratio of 0.368 and the economic-financial factor with the ratio of 0.098 has the highest and lowest shares respectively. The calculated incompatibility rate is 0.07. Therefore, the compatibility of the participation criterion with the options is acceptable. Fig. 6, shows a pairwise comparison of criteria with respect to bias criterion, and shows that the family-social factor with a ratio of 0.368 and the economic-financial factor with the ratio of 0.077 have the highest and lowest shares respectively. The calculated incompatibility rate is 0.08, so the compatibility of the bias criterion with the options is acceptable. A pairwise comparison of criteria with respect to family dispute criterion shows (Fig. 7) that the family-social factor with the ratio of 0.544 and economic-financial factor with the ratio of 0.052 have the highest and lowest shares respectively. The calculated incompatibility rate is equal to 0.1, so the compatibility of the family difference criterion with the options is acceptable. According to Fig. 8, which shows a pairwise comparison of criteria with respect to the criteria of communication centers, the family-social factor with the ratio of 0.479 and economic-financial factor with the ratio of 0.056 has the highest and lowest shares respectively. The calculated incompatibility rate is 0.08. Therefore, the compatibility of the centers of communication with the options is acceptable. A pairwise comparison of criteria with respect to the criteria of teamwork benefits shows (Fig. 9) the family-social factor with a ratio of 0.490 and the economic-financial factor with the ratio of 0.048, has the highest and lowest shares respectively. The calculated incompatibility rate is equal to 0.09. Therefore, the compatibility of the criterion of the benefit of teamwork with options is acceptable. According to Fig. 10, which shows a paired comparison of criteria according to the criteria of communication with service centers, the family-social factor with the ratio of 0.474 and economic-financial factor with the ratio of 0.047 has the highest and lowest share respectively. The calculated incompatibility rate is 0.05. Therefore, the compatibility of the criterion of communication with the service centers with the options is acceptable.

The family-social factor with a ratio of 0.526 and economic-financial factor with the ratio of 0.049 have the highest and lowest shares respectively (Fig. 11). The calculated incompatibility rate is 0.07 and since it is less than 0.1, the compatibility of the criterion of traditional beliefs with options is acceptable. Fig. 12 shows a paired comparison of the criteria according to the criteria of technical guidelines, cultural-communication factor with the ratio of 0.404 and economic-financial factor with the ratio of 0.034 have the highest and lowest shares respectively. The calculated incompatibility rate is 0.07 and since it is less than 0.1, the compatibility of the criterion of technical guidelines with the options is acceptable. However, Fig. 13, shows a paired comparison of the criteria according to the criterion of the existence of specialists with the family-social factor with the ratio of 0.503 and economic-financial factor with the ratio of 0.027, which is the highest and the lowest share respectively. The calculated incompatibility rate is 0.09 and since it is less than 0.1, the compatibility of the criterion of the availability of experts with options is acceptable. With respect to the adequacy of the machines (Fig. 14), the family-social factor with a ratio of 0.447 and economic-financial factor with the ratio of 0.031 has the highest and lowest share respectively. The calculated incompatibility rate is 0.09 so the compatibility of the criterion of the adequacy of the machines with the options is acceptable. Fig. 15 shows a paired comparison of the criteria according to the criteria of the workshop, the family-social factor with a ratio of 0.474 and economic-financial factor with the ratio of 0.033 have the highest and lowest shares

respectively. The calculated incompatibility rate is equal to 0.09. Therefore, the compatibility of the workshop criteria with acceptable options is acceptable. Using a paired comparison of criteria with respect to the dedication criterion (Fig. 16), the family-social factor with a ratio of 0.412 and the economic-financial factor with the ratio of 0.028, has the highest and lowest shares respectively. The calculated incompatibility rate is 0.08 so the compatibility of the endowment criterion with the options is acceptable. According to Fig. 17, which shows a paired comparison of the criteria according to the law of inheritance, the family-social factor with the ratio of 0.455 and the economic-financial factor with the ratio of 0.030, has the highest and the lowest share respectively. The calculated incompatibility rate is 0.07. Therefore, the compatibility of the criterion of the inheritance law with acceptable options is acceptable. However, a paired comparison of the criteria according to the participatory law (Fig. 18), the cultural factor is related to the ratio of 0.360 and the economic-financial factor with the ratio of 0.040, has the highest and lowest shares respectively. The calculated incompatibility rate is 0.09 so the compatibility of the criterion of the participatory law with the options is acceptable. A paired comparison of the criteria according to the criteria of the division of land (Fig. 19), the family-social factor with a ratio of 0.316 and the economic-financial factor with the ratio of 0.073 has the highest and lowest shares respectively. The calculated incompatibility rate is 0.07. Therefore, the compatibility of the criteria for the division of land with options is acceptable.

According to Fig. 20, which shows a paired comparison of the criteria according to the price difference criterion, the educational-technical factor with the ratio of 0.340 and the economic-financial factor with the ratio of 0.033 have the highest and lowest shares respectively. The calculated incompatibility rate is equal to 0.06. Therefore, the compatibility of the price difference criterion with the options is acceptable. Based on Fig. 21, which shows a paired comparison of criteria according to the criteria of bad economic conditions, the family-social factor with the ratio of 0.417 and the economic-financial factor with the ratio of 0.030 has the highest and lowest shares respectively. The calculated incompatibility rate is 0.08 so that the compatibility of the bad economic conditions with acceptable options is acceptable. Paired comparison of criteria according to the criteria of equipment cost (Fig. 22), the cultural-communication factor with the ratio of 0.400 and the economic-financial factor with the ratio of 0.028, has the highest and lowest shares respectively. The calculated incompatibility rate is equal to 0.1 so the compatibility of the equipment cost criterion with the options is acceptable. According to Fig. 23, which shows a paired comparison of the criteria according to the criteria of bank facilities, the family-social factor with a ratio of 0.434 and the economic-financial factor with the ratio of 0.032 has the highest and lowest shares respectively. The calculated incompatibility rate is 0.09. Therefore, the compatibility of the bank facilities criterion with options is acceptable.

Fig. 4 Comparison of criteria in the form of a pair of criteria for awareness benefits

Fig. 5 Comparison of criteria in terms of participation rate

Fig. 6 Comparison of the criteria in a pairwise way to the bias criterion

Fig. 7 Comparison of criteria in relation to family differences

Fig. 8 Comparison of criteria in two ways compared to the criteria of communication centers

Fig. 9 Comparison of benchmark criteria in comparison to the benchmark of group work benefits

Fig. 10 Comparison of criteria in terms of the ratio of service centers to criteria

Fig. 11 Comparison of criteria in the form of a pair of traditional beliefs

Fig. 12 Comparison of criteria in a pair to the standard of technical instruction

Fig. 13 Comparison of criteria in the form of a pair of experts

Fig. 14 Comparison of criteria in a pairwise manner with respect to the adequacy of machines

Fig. 15 Comparison of the criteria in terms of the criteria of the workshop

Fig. 16 Comparison of criteria in the form of a pair of deductive criteria

Fig. 17 Comparison of criteria in the form of a pair of criteria of the inheritance law

Fig. 18 Comparison of benchmarks in terms of the law of participation

Fig. 19 Comparison of criteria in a pairwise way to the land parcel standard

Fig. 20 Comparison of criteria in a pairwise way to the price difference criterion

Fig. 21 Comparison of benchmarks in terms of economic criteria

Fig. 22 Comparison of criteria in terms of equipment costs

Fig. 23 Comparison of benchmarks in terms of banking facility criteria

3.3 Integration

Based on the results of the integration of options and criteria according to the purpose of the study (Fig. 24) it can be concluded that among the barriers to implementation of the agricultural mechanization development project in Jiroft city, family-social factor was the most deterrent factor. The economic -financial factor is of the least importance. Finally, it can be said that the factors preventing the development of agricultural mechanization in Jiroft city due to fragmentation of lands are social-family, cultural-communication, educational-technical, lawful- legal, economic-financial.

Fig. 24 The final weight of the options

3.4 Sensitivity analysis

Often, the data presented from the multi-criteria decision-making process are variable, so an important step in the application of hierarchical decision-making problems (AHP) is to perform sensitivity analysis on the output data, which shows that the results obtained from fuzzy AHP to what extent is it reliable, and to what extent has the decision maker acted confidently in his judgments, or to what extent has he been able to differentiate between the options and distinguish them from each other.

The sensitivity analysis performed on the target node shows the sensitivity of the options to all the criteria under the target, in five types:

1. *Dynamic* ***2.*** *Performance* ***3.*** *Gradient* ***4.*** *Head to Head* ***5.*** *Two Dimensional*

Fig. 25 shows the ranking of different options of not developing mechanization in relation to the criteria. As can be seen in this diagram, the social-family option is the most sensitive to family differences.

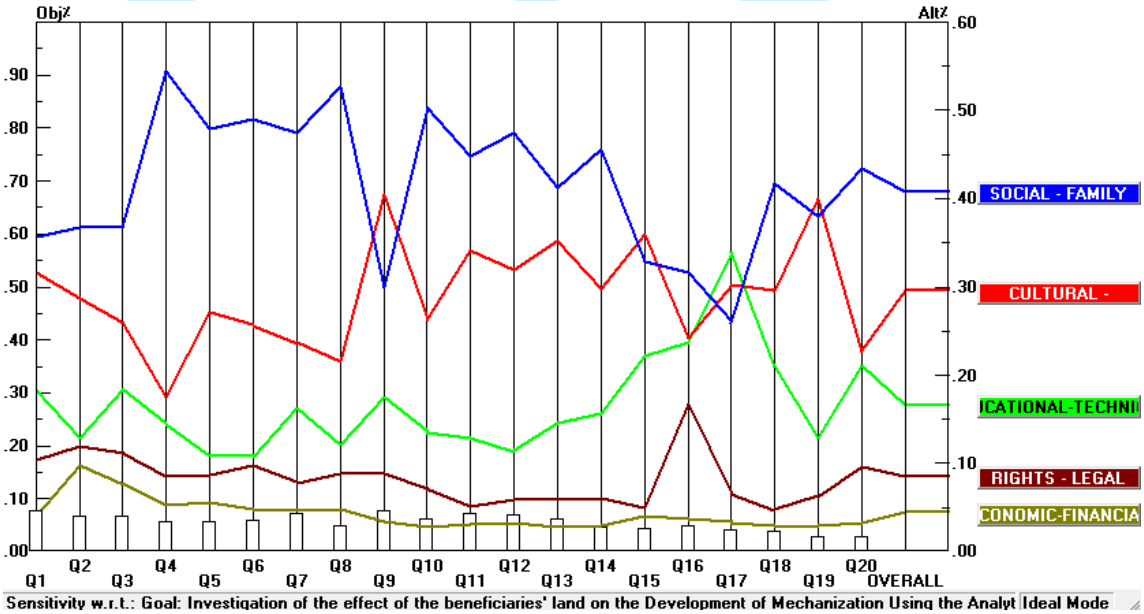

Fig. 25 Sensitivity analysis based on performance against the overall goal

As can be seen in Fig. 26, in the analysis of sensitivity based on dynamics towards the overall goal, the highest sensitivity was related to the social-familial criteria, then the cultural-communication criteria. That is, in prioritizing the lack of development of mechanization in the region, the social-family criterion has had the greatest impact.

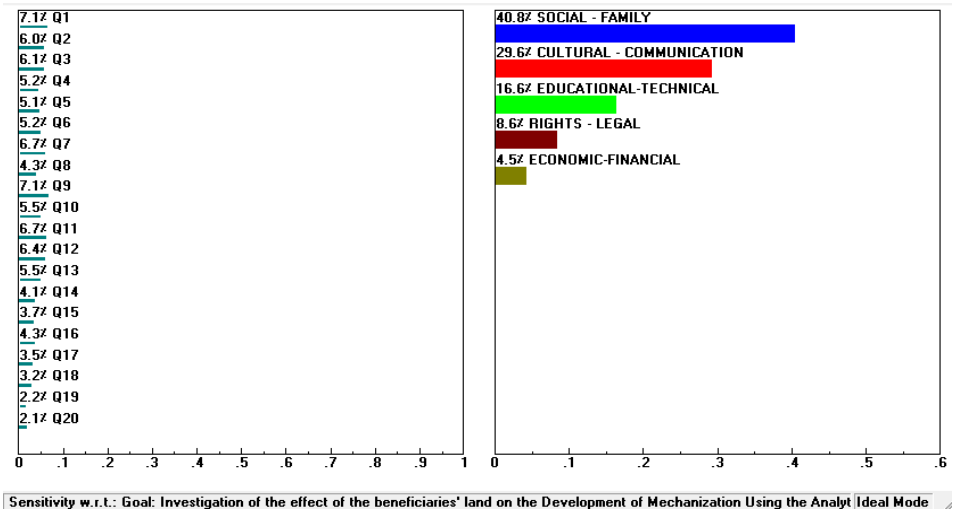

Fig. 26 Sensitivity analysis based on dynamics with respect to the overall objective

Fig. 27 shows the effect of the criterion of the benefits of knowledge in prioritizing options and it is clear that social-family issues are higher than the others in terms of the benefits of knowledge. Of course, as seen in this diagram, cultural-communication, educational-technical, legal-legal and economic-financial issues are similar in terms of the performance of the benefits of awareness.

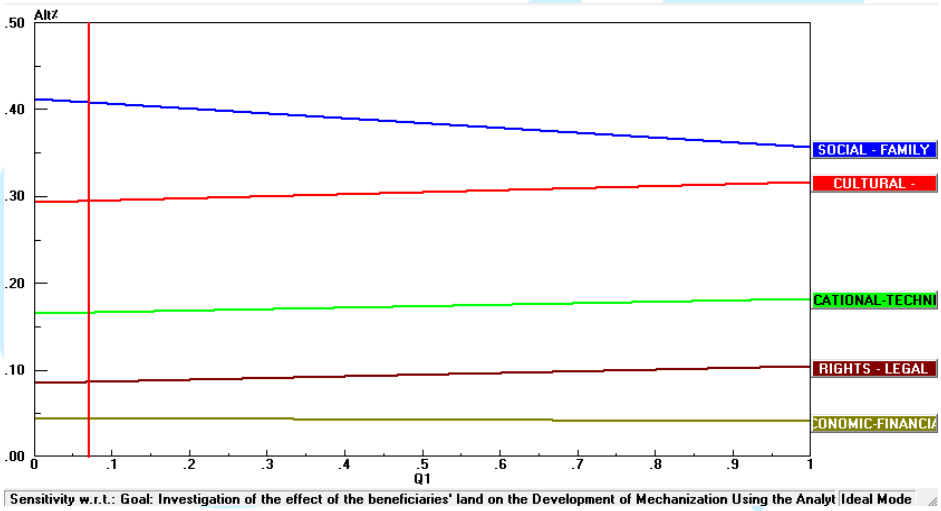

Fig. 27 Sensitivity analysis based on slope relative to the overall target

As it can be seen in Fig. 28, the sensitivity analysis of two social-family and cultural-communication processes, in social-family issues, the criterion of family difference has the most weight and is the most effective criterion in social issues. - Family has been specified.

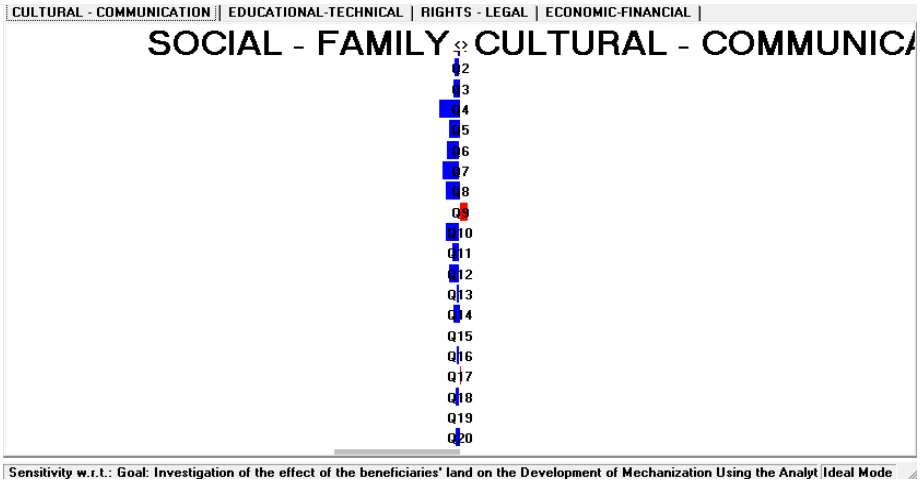

Fig. 28 Sensitivity analysis on a head-to-head basis with respect to the overall target

In Fig. 29, the sensitivity analysis has been done on the two criteria of the benefits of awareness and participation. This graph shows that social-family issues are recognized as a desirable option in terms of the benefits of awareness and participation.

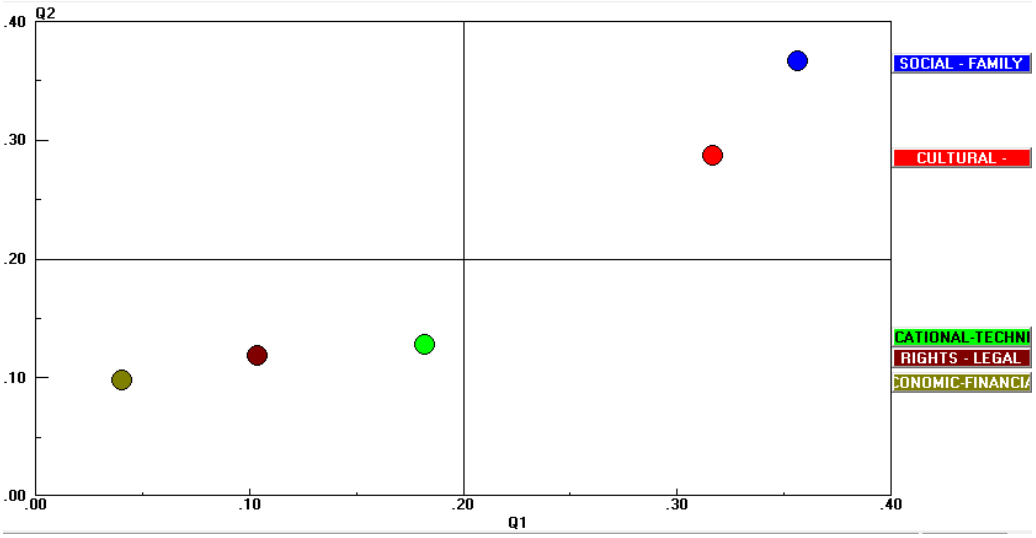

Fig. 29 Two-dimensional sensitivity analysis to the overall target

Factors influencing the lack of development of agricultural mechanization in each region are different according to its conditions. For example, the study of Hashemipour and Zamani (2016), in Qazvin-Iran showed that the most important factors are inheritance, population growth and literacy, and in Azna-Iran, according to Mahdavi and Kiani (2017), individual-social and economic factors; and in Jiroft, family- social factors play a significant role in agricultural development.

4. Conclusions

Given the existing theoretical scope, present findings and limitations, and the results obtained from the Analytical Hierarchical Process technique model, the most important cause of land fragmentation is the family-social factor in Jiroft whereas family disputes have a strong role that village elders can play in mediation and problem solving. This process is done by involving all supply chain actors, analyzing problems and providing solutions. Applying mechanisms for organizing family farms, investing in infrastructure, adapting world technologies to country conditions in the scale of small farms (localization), marketing and branding are some of the most experienced strategies in the world for developing small farms. Familiarizing farmers with the benefits of mechanization development through promotional activities and through awareness raising will encourage them to expand the mechanization coefficient in their land. Farmers, for cultural reasons and not merely for economic reasons, have little risk-taking potential and therefore do not readily accept any new proposal simply because it is new. However, if leading farmers and local leaders who are largely trusted by farmers voluntarily implement mechanized development plans on their land, there will be considerable scope for acceptance by farmers, especially when the positive results of the plan are well known. Progressive farmers, if they accept themselves as innovators and implementers of the project on their land, will certainly help to boost the confidence of other farmers. Another influential factor was the technical skills of farmers. Undoubtedly, one of the obstacles to the acceptance of technology by farmers is the lack of skills in the use of equipment, which tend to be employed by participating in training classes and improving the technical skills of using different machines mechanization increases at the farm level.

Funding Information

The authors did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of Conflict

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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