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Management and prioritization of barriers to land integration in the field of agricultural mechanization in Jiroft - Iran

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Abstract. Existence of small and scattered agricultural lands in Jiroft located in southeastern Iran, as an agricultural area and lack of effective use of modern technology, to conduct a study with the aim of managing and prioritizing the factors of effective reduction in land reduction as an obstacle to progress in mechanization, By providing solutions for agricultural development, appropriate. The statistical population of the research, including all land users, agricultural experts and sample members, have been purposefully selected from among them according to the objectives and questions of the research. The research instrument was a questionnaire, that its validity reviewed and corrected using a group of academic researchers and experts in the field of agricultural land fragmentation. Hierarchical analysis to prioritize the effective factors with Expert Choice software revealed that social, economic, environmental and structural factors contribute 39%, 30%, 17% and 14%, respectively. The results showed that the criteria of family disputes and inheritance related to social factors are the most important barriers in this area in the region. For develop Jiroft mechanization; It is recommended to pay attention to the role of village elders in mediating and solving problems, amending the inheritance law, implementing an optimal cultivation pattern ,giving financial credit for the modernization of agricultural implements.

Keywords. Analysis; development; Factor; Impact; Jiroft; Small Land

Introduction

Agriculture is one of the oldest forms of economic and productive activities. Basically, major civilizations have been formed around the axis of agriculture (Shakuri,2005). Due to the current situation, the agricultural sector is not able to provide desirable and sustainable food security for the current and future society; therefore, it needs to move from the stage of livelihood and traditional production to the stage of commercial and industrial production. Therefore, it is necessary to adopt expert measures to modernize and comprehensive development of the agricultural sector (ZareMehrjerdi et al. ,2017). Modern agriculture in Western Europe developed after World War II through mechanization and specialization, followed by structural development and increased productivity (Hartvigsen,2014).The system and structure of agricultural lands are affected by various key variables such as population of

exploiters, status of basic production resources, human, social, natural, and Etc.(Sklenicka et al.,2017). Fragmentation and dispersion of land in most parts of the world is a major obstacle to sustainable agricultural development and can cause damage sustain in agriculture (Cay and Uyan, 2013).This phenomenon leads to low productivity in agricultural management (Shokati Amghani et al., 2018).

LITERATURE REVIEW

The results of *Sadeghi et al.* (2008) on the reasons for the development of agricultural mechanization in South Khorasan province showed that land integration and technology provision appropriate to the size of farms is necessary for the development of mechanization in the region. Also, training classes for farmers and users will make optimal use of available resources. Average annual household income, arable land per capita, size of land rented by the household, labor force Household, family size, number of crops planted by the household, and size of leased land all contribute to land fragmentation. *Rusta and Teymouri* (2009) in prioritizing the factors of preventive development of land integration plan in Darmian city, South Khorasan with the technique AHP concluded that social factor in Darmian city is the main factor of prevention and cultural, economic and structural factors are in the next priorities. *Sadeghian* (2015) examined the tendency to agricultural mechanization and its impact on rural development in Horand-Iran, The results of his research showed that farmers with higher education and satisfaction with the Agricultural Jihad Organization are more inclined to mechanization. *Alemu et al*.(2017) in examining the effects of land division on productivity in northwestern Ethiopia showed that land division is a global feature of all agricultural systems that affects agricultural land productivity. In this region, the average size of agricultural land is 1.25 hectares as the minimum size that can have a minimum production.Studies by *Hiironen and Riekkinen*(2016) on the effects of agriculture and the profitability of land integration in Finland show that land integration is an effective and applicable management tool to improve the asset structure and, if implemented, will reduce production costs by an average of 15%. *Cintina and Pukite* (2018) in their analysis of the factors influencing agricultural land use in Latvia, concluded that influencing factors of the use of agricultural land. Influenced by several factors the main problems associated with the use of agricultural land are the increase of unused agricultural land, the continued degradation of land, but the major problem of land use is the existence of a fragmented property structure. For the efficient use of agricultural land, there are several conditions that need to be met or improved to achieve effective land use. *Mrema and Kienzle* (2018) in examining the current state and future prospects of mechanization agriculture in sub-Saharan Africa, they found that most agricultural work relies on human muscles and that the use of tractors and other mechanized equipment is low. For mechanization, the supply of agricultural equipment and machinery must be on the agenda. Contrary to the researches that have investigated the reasons for the fragmentation of agricultural lands. *Shokati et al.*(2019) in a study to identify the factors that prevent and prevent the acceptance of the agricultural land integration plan in the Shousha region of Iran showed that it takes 3 to 9 years for the optimal implementation of the plan and that the variables of income, agricultural machinery ownership, Non-agricultural occupation, distance between plots, level of education, participation in extension classes and awareness of the benefits of the plan have a positive effect and in contrast to variables such as farmers' experience, number of plots, loan amount and number of household members have a negative effect on acceptance. The results of research *Tuyen et al.* (2019) on agricultural land suitability analysis for Yen hills (Nghe An,Vietnam) using hierarchical analysis process showed that showed that 12.33 per cent of land surface is highly suitable for agriculture, 20.33% moderately suitable, 29.26 per cent marginally suitable, and 38.08 per cent

unsuitable. The areas where further agriculture development can be done have been suggested within the limitation of land development laws of Vietnam, considering socio-economic requirement and maintaining tradition of local inhabitant.

Hypotheses

Given that Iran is on the path of progress according to the Sixth Strategic Development Plan. Agricultural officials attach special importance to progress in agriculture. Including the introduction of knowledge and technology, the expansion of the use of research and technological achievements in the agricultural sector and the development of knowledge-based companies as an important factor in economic growth(Anonoymous,2016). Therefore, it is necessary to identify important and effective metrics to achieve this goal based on existing conditions, facilities and constraints. The present study understands the importance of addressing the challenges of mechanization development. Based on the hypotheses of this research, it is believed that:

1.The most important obstacle to the development of mechanization in the study area is the small size of the land, the size of the effective factors can be obtained through statistical studies.

2.Knowing that a coherent and codified plan for the development of agricultural mechanization has not been prepared for the study area, it is possible to identify obstacles to the development of agricultural mechanization and provide practical solutions for agricultural development in the region.

3.The cooperation of the farmers of the region and the use of the opinions of experts, leads to the integration of lands and development.

Methods

In this research, according to the objectives and research questions, a descriptive comparative research method has been used with the comparative purpose of applying multi-criteria decision making methods in assessment. The statistical population includes faculty members and experts who are aware of management and fragmentation of the land and agricultural mechanization issues who are working in different points (for example, the Ministry of Jihad Agriculture, regional universities, agricultural research center) because for analysis Data through the method of hierarchical analysis process is not important. For this study, 30 people based on principles such as agricultural specialization, having an article related to land management related topics and willingness to participate in the study. They were selected by non-random and purposeful methods. The tool used to collect the required data was a researcher-made questionnaire in which the hierarchical analysis process was used to make pairwise comparisons between factors and effective criteria for land fragmentation (to determine the importance of each of these factors). To extract these factors and criteria - through accurate and extensive evaluation of research background, common criteria with the highest frequency in the studies were identified and based on their similarity in 4 groups of social and cultural(with 6 criteria), economic(with 5 criteria), structural (with 5 criteria), environmental (with 4 criteria) were classified. The questionnaire was sent by E-mail to selected professors and experts in this field and they were asked to rate the importance of each of the pairs of identified components relative to each other; Specify according to the given instructions and after completing the questionnaire, return it by E-mail. To assess the validity of the questionnaire, the obtained factors and criteria were surveyed by 5 experts in this field and final confirmation was made with minor corrections and changes. The reliability of the instrument in this type of research depends to a large extent on the validity of the hierarchical analysis method,

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which determines the compatibility rate. If the incompatibility rate is less than 0.1, the compatibility of the comparisons is acceptable, otherwise the comparisons should be revised (Kiarzam and Koohkan, 2013). In the present study, the rate, incompatibility, comparison of factors and related criteria were calculated and confirmed using Expert choice software.

Results

The fragmentation of agricultural lands depends on several factors. In this study, the factors and criteria related to land fragmentation were studied and analyzed in terms of mechanization development. For this purpose, important criteria introduced in previous research were considered using the opinions of agricultural experts and experts. Important factors affecting land fragmentation, social, economic, structural and environmental factors were determined Table 1. Then, the hierarchical analysis technique was used to assess the importance of each factor and related criteria. The hierarchical decision tree structure of these factors and criteria is shown in Figure 1.

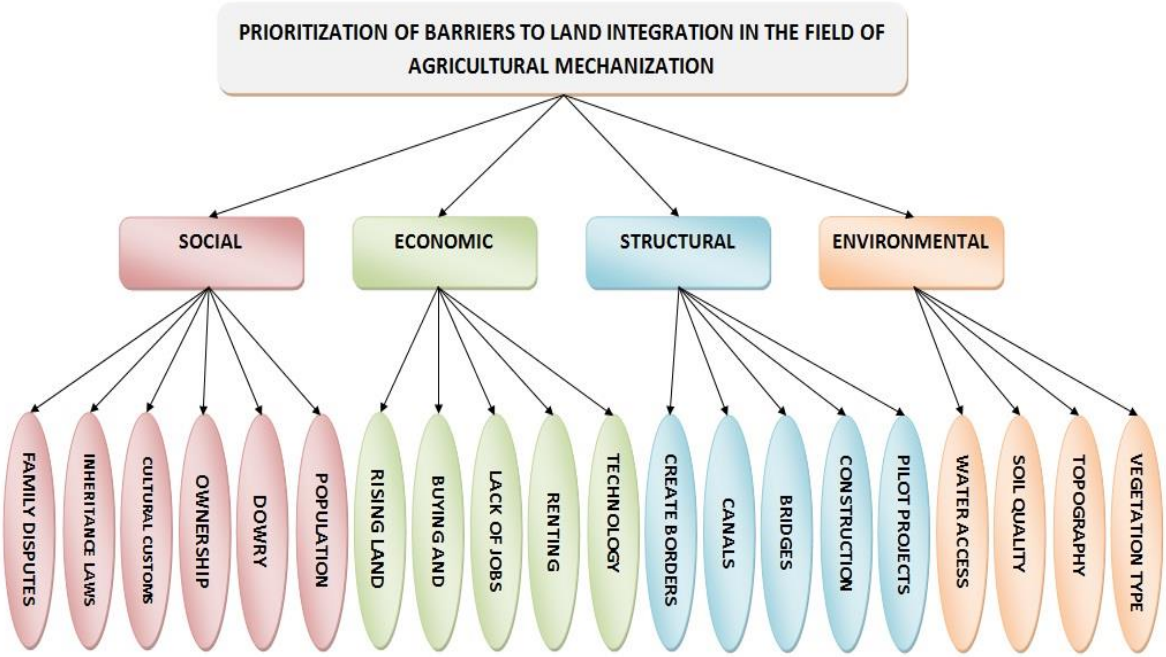

Figure 1. *General structure of the tree hierarchy*

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Table1. *Factors and criteria of land fragmentation in the mechanization dimension*

Factors	Criteria
Social	Ownership, Inheritance Laws, Endowment Laws, Political Decisions, Cultural Customs, Dowry , Population Growth, Family Disintegration.
Economic	Exploitation, economic structure, renting, buying and selling, lack of jobs non-agriculture, lack of alternative industries, technology, livelihood economy, rising land prices near cities.
Structural	Settlements, bridges, canals, industrial development, construction, implementation of pilot projects
Environmental	Mofology, topography, vegetation type, soil quality, water access, hydrological networks

The results of data analysis based on a two-to-two comparison between the four factors and the relevant criteria using Expert choice software showed:

In terms of influencing the fragmentation of Jiroft lands, the social factor is the highest and the structural factor is the least important, economic and environmental factors are between the two, respectively. Figure2.

Figure2*. The coefficient of importance of the effective factors in land fragmentation*

If we examine all the pairs of comparisons related to all factors in combination with the purpose of the study (the effect of factors affecting the fragmentation of the earth in the mechanization dimension) it is observed that among the 20 criteria compared, the highest coefficient Significance (0.071) belongs to the criterion of family disputes and the lowest coefficient of importance (0.021) belongs to the criterion for pilot projects. The overall inconsistency coefficient of the criteria is 0.01.

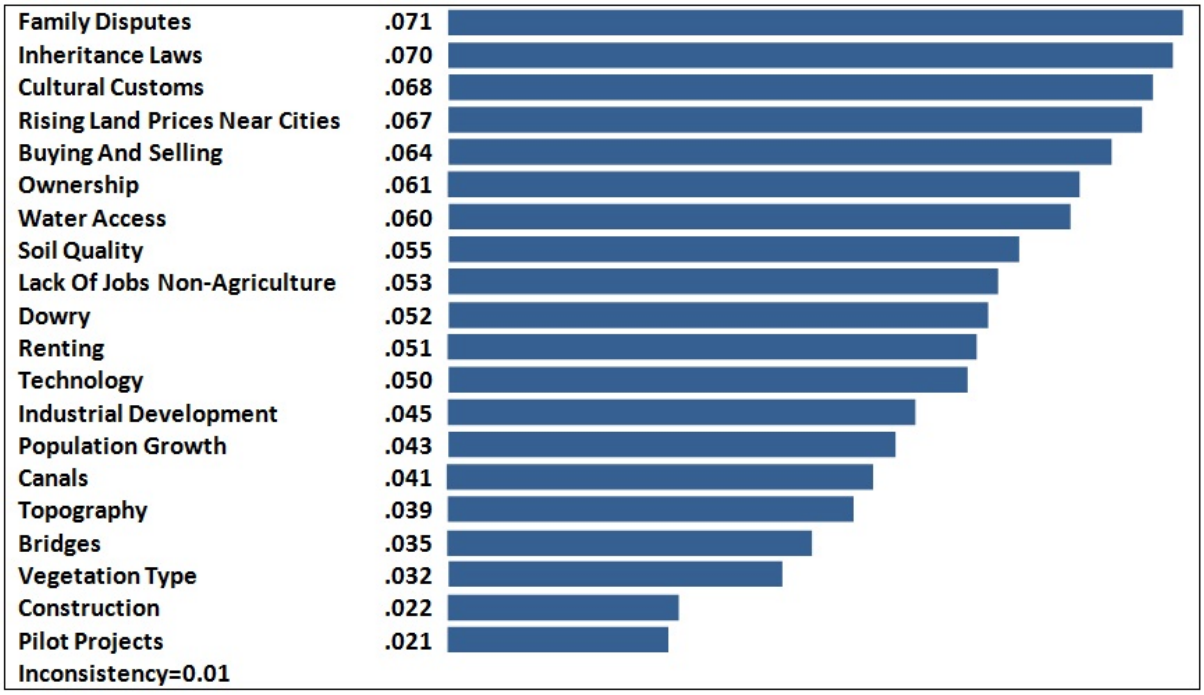

Figure3. *Coefficient of importance of effective criteria in land fragmentation on mechanization*

Assessing the weight assigned to each of the criteria in the socio dimension shows that the criterion of family disputes has the highest weight in this set (0.303) and the criterion of population growth has the lowest weight (0.053). The rate of inconsistency between pairwise comparisons of the criteria is also 0.06. Figure4 .

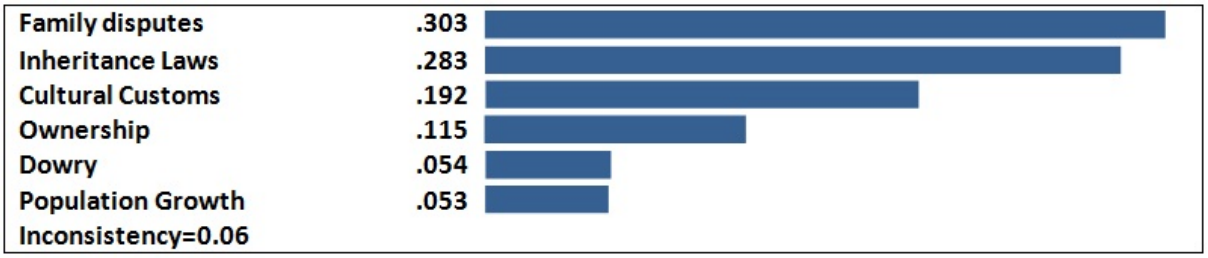

Figure4. *Coefficient of importance of social factor criteria*

Assessing the weight assigned to each of the criteria in the economic dimension shows that the criterion of rising land prices near cities has the highest weight in this set (0.301) and the criterion of technology has the lowest weight (0.061). The rate of inconsistency between pairwise comparisons of the criteria is also 0.08 Figure5 .

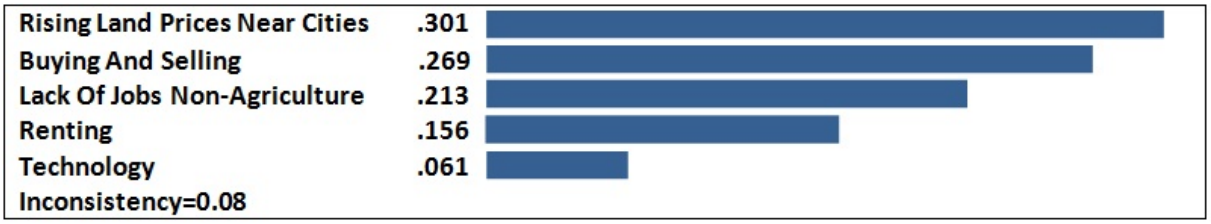

Figure5. *Coefficient of importance of economic factor criteria*

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Assessing the weight assigned to each of the criteria in the land user dimension shows that the criterion of create borders has the highest weight in this set (0.291) and the criterion of pilot projects prices near cities has the lowest weight (0.045). The rate of inconsistency between pairwise comparisons of the criteria is also 0.04 Figure6 .

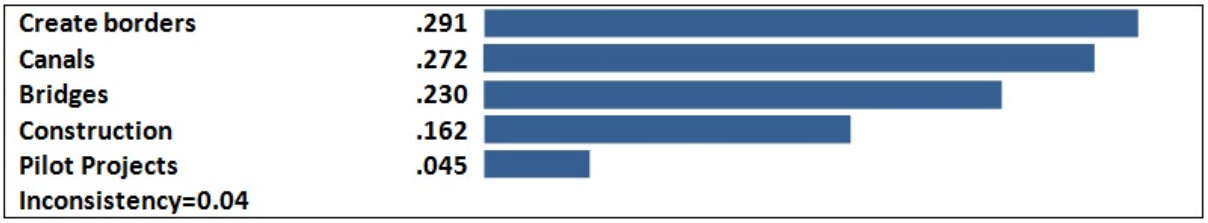

***Figure6**. Coefficient of importance of land user factor criteria*

Assessing the weight assigned to each of the criteria in the environmental dimension shows that the criterion of water access has the highest weight in this set (0.277) and the criterion of vegetation type has the lowest weight (0.197). The rate of inconsistency between pairwise comparisons of the criteria is also 0.07 Figure7 (see Appendix).

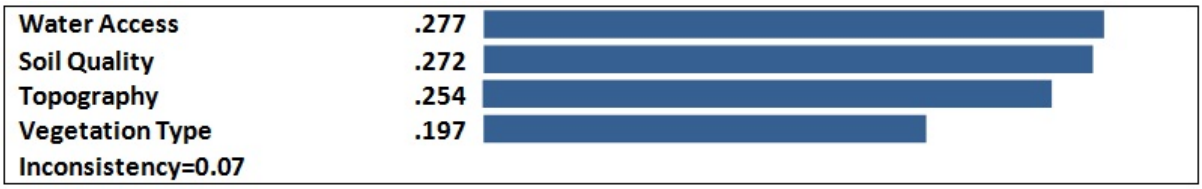

***Figure7**. Coefficient of importance of environmental factor criteria*

Discussion

Today, sustainable development as the main goal of development in the agricultural sector will be achieved when basic resources such as land are protected and used within the framework of technical standards. In the formation of new production systems in the agricultural sector and the use of technology and mechanization of various stages of the production process of agricultural products (planting, maintenance and harvesting) In order to achieve sustainable agricultural development, irregular distribution of arable land is considered as a deterrent that reduces productivity and increases production costs.(Rezaei moghaddam, 2014) Accordingly, the purpose of this study is to manage and evaluate the factors affecting land fragmentation in the field of agricultural mechanization in order to provide appropriate strategies for agricultural development in Jiroft.

Based on the results of this study, the social factor has the largest share in the fragmentation of agricultural lands. Criteria, respectively: family disputes, inheritance laws, cultural customs, property, dowry and population growth are related to this factor. The results of this part of the research are consistent with the findings of various researchers such as (Izadi and Taj , 2011), (Najafikani and Shahkooei, 2016).

Conclusion

According to the existing theoretical scope, existing findings and limitations and the results obtained from the model of hierarchical analytical method, the most important cause of land fragmentation is the social factor in Jiroft-Iran. People adhere to their past traditions and values and have a high level of trust in elders in managing their community. The role of elders

in resolving disputes and cohesion in rural areas of the study area is at a high level. Paying attention to this will lead to land integration and more cooperation between family members in the implementation of agricultural development projects. According to various national and foreign studies in recent years, it has been proven that the shrinkage of land due to inheritance prevents the optimal use of agricultural land in terms of economic efficiency. Therefore, the division of agricultural lands by the law of inheritance is considered as a loss for both the current and future generations, which also contradicts the text of the definition of sustainable development. According to the World Commission on Environment and Development, sustainable development is a development that can meet current generational needs without compromising the ability of future generations to meet their own needs (Nasiri, 2000).Establishment of a specialized commission with the participation of professional experts to study the issue of inheritance in depth and make the necessary and appropriate decisions to make fundamental changes in the division of agricultural lands through the law of inheritance. Finally, the decisions of this commission should be communicated to the parliament so that the deputies can act for the approval of the new law.

Given that the most important economic factor is the sale of agricultural land near the city of Jiroft and land near urban areas can be used as housing, by limiting land use change, agricultural land cannot be divided.

According to the results of this study, the most important environmental factor that has caused the fragmentation of agricultural land is access to water. In recent years, due to drought and water shortages, some agricultural lands have been removed from the cultivation cycle and become barren land, and the rest of the existing lands are also facing the challenge of water shortage and drought, and in the near future due to the possibility of drought, drying wells or water shortages of these parts will also be taken out of the cultivation cycle. Therefore, as this drought continues, over time, some agricultural lands will fall out of the production cycle and, as a result, lands will become smaller. In the current situation, agricultural water resources are facing a serious crisis due to the existence of illegal wells and the over-exploitation of surface and groundwater resources. It is suggested that in order to prevent drought and water shortage in the agricultural sector, first the scientific and expert form of the surface and groundwater status of the region should be studied and its amount should be predicted for the coming years. Then, by examining the current situation of the agricultural sector in the region, its comparative advantage and its actual and potential potentials are identified. In the following,

taking into account the above factors, the optimal cultivation pattern should be defined for the region so that cultivation and work in that region can be done according to a regular schedule. With the implementation of the optimal cultivation model, the amount of water utilization will reach its standard level and the severity of water shortage crisis and drought in the future will be reduced.

According to the results of this study, among the factors affecting the fragmentation of agricultural lands in terms of mechanization in Jiroft, the land use factor is less valuable and among the relevant criteria, creating a border is more important. By creating land borders, farmers are defining their ownership of the area, which is fragmenting the land and eliminating the possibility of using large machines due to rising costs. It is suggested that in order to encourage agricultural landowners (who own less than the technical and economic quotas), the government and other relevant bodies grant special privileges such as: financial, credit, legal, commercial, technical and construction to integrate lands.

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